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PROCEEDINGS
OF THE
Bournemouth Natural Science Society.

VOL. XXIX.

SESSION 1936-37.

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BRITISH MUSEUM
NATURAL HISTORY

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BRITISH MUSEUM
NATURAL HISTORY

Introductory Note.

THE Bournemouth Natural Science Society was founded in 1903, being the successor to an older society which was formed in 1883 and dissolved in 1897. The early meetings of the Society were held in a room hired from time to time for the purpose, but the need for some fixed quarters was soon felt. To meet this need a small room was taken at 122 Old Christchurch Road, and, as this proved inadequate, in February, 1909, better accommodation was secured at Granville Chambers and retained for four years. In March, 1913, the Society took on lease from the Education Committee a large room on the ground floor of the Municipal College. In 1919 this also had to be given up, and the Society succeeded in acquiring a house of its own, 39 Christchurch Road. The formal opening was on February 7, 1920. In 1929 a Lecture Hall was added, and the ground floor of the old building reconstructed. The work was completed and the New Hall inaugurated on October 14, 1929.

The objects of the Society are declared by the second of its rules to be "the promotion of the study of Science in all its branches, by means of Lectures, Field Meetings, the Reading and Discussion of Papers, and the formation of Sections of its members devoted to any particular branch of the Society's work, and in any way that the Council of the Society shall deem advisable.

The Sections at present working are as follows:— **Archæological and Historical, Astronomical, Botanical, Entomological, Geographical, Geological, Microscopical, Photographical and Record, Physical, and Zoological.**

During the WINTER SESSION, from October to April, GENERAL and SECTIONAL MEETINGS are held, comprising Lectures and Demonstrations on subjects of scientific interest, illustrated by lantern slides, diagrams, specimens or experiments.

All meetings are open to all members of the Society.

Throughout the SUMMER SESSIONS, EXCURSIONS to places of interest in the neighbourhood are arranged and indoor or garden meetings occasionally held.

The management of the Society is vested in a Council, which is elected at the Annual General Meeting, held in October.

The Society possesses a Library available for the use of members. This is yearly becoming more extensive and valuable by the acquisition of standard text books and of books dealing with matters of local scientific interest. Books may, under certain conditions, be borrowed by members, and there is a Reading Room in which works of reference may be consulted.

The Society's collections of archæological, botanical, geological, zoological and other specimens are now arranged in the Museum. Articles on the collections were contributed to Vols. V. X. and XVII. of the Proceedings by Sir Daniel Morris, Mr. W. G. Wallace and Rev. C. O. S. Hatton respectively.

Members are elected by the Council and pay an annual subscription of £1 for full membership (admitting to all meetings and excursions for the year), a subscription of £2 covers four adult members of the same family residing in the same house.

A Monthly Notice, giving full details of all meetings, etc., is posted to every member before the beginning of each month, and a volume of Proceedings is published every year.

Application Forms for Membership, and further particulars, can be obtained from the

HON. SECRETARY,

Bournemouth Natural Science Society,
39 Christchurch Road,
Bournemouth.

Bournemouth Natural Science Society.

OFFICERS AND COUNCIL FOR 1936-37.

President

SIR HAROLD CARPENTER, M.A., D.Sc., F.R.S. Etc.

Vice-Presidents

G. Brumell, A.R.I.B.A.
Henry Bury, M.A., F.L.S., F.G.S.
G. E. J. Crallan, M.A., M.B., M.R.C.S.
Rev. F. C. R. Jourdain, M.A., F.Z.S., M.B.O.U.
Miss Marcia Penrose, B.SC.
Heywood Sumner, F.S.A.

Chairman of Council

H. Bury, M.A., F.L.S., F.G.S.

Deputy-Chairman of Council

Rev. F. C. R. Jourdain, M.A., F.Z.S., M.B.O.U.

Council

The Officers and Chairmen of Sections (ex-officio)

F. Broad, F.S.I.
E. St. John Burton, F.G.S., F.R.S.A.
H. de Castro
Miss C. H. Fryer
F. L. Lowther, B.A.
Miss M. Penrose, B.SC.
W. G. A. Robertson, M.D., D.SC.
J. F. Spencer
H. J. Wadlow
Miss S. Wetherell
G. G. Wren

Chairmen of Sections

Archæological and Historical · Prof. J. Cameron, M.D., D.SC.
Astroneomical : W. Goodacre, F.R.A.S.
Botanical : L. Beeching Hall, F.L.S.
Entomological : G. E. J. Crallan, M.A., M.B.
Geographical : W. J. Woodhouse, A.C.P.
Geological : Henry Bury, M.A., F.L.S., F.G.S.
Microscopical : M. McDougall, M.B., B.S.
Photographical and Record : S. Whitaker.
Physical : W. H. Marsh, B.SC
Zoological : Rev. F. C. R. Jourdain, M.A., F.Z.S., M.B.O.U.

Hon. Treasurer

G. Brumell, A.R.I.B.A.

Secretaries

Hon. Secretary : W. J. Woodhouse, A.C.P., M.I.H.,
Assistant Secretary : Miss K. A. Hunkin, B.A.

Hon. Librarian

S. Whitaker.

Hon. Editor

J. R. White, M.A.

Hon. Curator

B. Gorton, M.R.C.V.S., M.P.S.

Hon. Auditors

F. Broad, F.S.I., J. C. Woods.

Bankers

National Provincial Bank of England, Bournemouth.

List of Members.

Revised to 1st November, 1937.

* HONORARY MEMBERS. † PAST PRESIDENTS.
O ORIGINAL MEMBERS. L LIFE MEMBERS.
G MORRIS GOLD MEDALLIST. A ASSOCIATE MEMBERS.
The year of election is given before the name of each member.

A

1932	Abbott, A. H.	Portman Cottage, 755 Christchurch Road
1932	Abbott, Mrs.	,, ,, ,, ,,
1935	Abbott, F. E., J.P., C.C.	Shortwood, Christchurch.
1931	Adams, V. J.	7 Holdenhurst Road
1927	Adkins, H.	Glenavon, 107 Alumhurst Road
1935	Ainslie, Capt. M. A., R.N., B.A., F.R.A.S.	Grenville, Talbot Drive, Wallis Down
1934	Allan, Miss M. W. R.	6 Chigwell Road
1923	Anderson, Mrs. M.	Ranfurly, 18 Dean Park Road
1933	Andrews, Rev. P. T., M.A.	Foxwold, 34 Belle Vue Road, Southbourne
1937	Ansell, Miss E. M.	53 St. Catherine's Road, Southbourne
1933	Anthony, Miss C. H.	75 St. Luke's Road
1937	Asquith, Miss K.	2 Warwick Court, Hawkwood Road, Boscombe

B

1937	Bacon, Capt. F.	21 Penn Hill Avenue, Parkstone
1937	Baker, C. A., M.I.E.E.	Clieveden, 36 The Avenue, Branksome Park
1937	Baker, Mrs. L. M.	,, ,, ,,
1929	Baker, H. J., F.I.A.	Clifton, Sandbourne Road
1936	Baker, Miss M. E.	3 Penrith Road, Boscombe
1936	Banham, Miss	Southernhay, Cambridge Road
1930	Banks, R. McLachlan, M.B., C.M., D.P.H.	35 Norwich Avenue
1935	Banks, Mrs.	,, ,,
1905	Barlow, E. W., B.SC., F.R.A.S., F.R.MET.S.	Greengates, Wadhurst, Sussex
1912	A Barraclough, A., M.A., F.R.G.S.	93 East Avenue
1936	Barran, Sir Rowland	Rockstead, West Overcliff Drive.
1909	Barratt, J. Hayes	16a St. Augustine's Road
1924	Barratt, Mrs.	,, ,, ,,
1924	Barratt, Miss P. M.	,, ,, ,,
1927	Bater, G. W., B.A.	22 Dingle Road
1933	Beauchamp, A. H., L.R.I.B.A.	32 Hamilton Road, Boscombe
1931	Beckett, S. J.	Pineville Hotel, West Cliff Gardens
1932	Belcher, T. E.	Trefloyne, Sandringham Road, Parkstone
1937	Bell, T. Marshall, B.A., M.B., M.R.C.S.	255 Belle Vue Road, Southbourne
1937	Bell, Mrs. R. E. S.	,, ,, ,,
1920	Bennett, Risdon, M.A.	Yew Tree Cottage, Broadstone

1935	Bigg, Mrs. W.	Ladies' National Club, 24, Poole Road.
1937	Black, Miss O. M.	Broadlands, West Moors Road, Ferndown
1920	Borrett, Surg.-Capt. G. G., R.N.	Church Lane, Wool, Wareham, Dorset.
1932	Borrow, F.	The Knoll, 281 Charminster Road
1932	Borrow, Mrs.	,, ,,
1929	Bourdass, Miss A.	7 Beaulieu Road
1929	Bourdass, Miss F.	,, ,,
1920	ABourne, Miss C. M.	2 Alexandra Road, West Southbourne
1930	*†Bower, Prof. F. O., D.SC. F.R.S.	2 The Crescent, Ripon
1932	Brett, R. K.	Anglebay, Colehill, Wimborne
1936	Brewitt-Taylor, E. G.	10 Forest Road, Branksome Park
1922	Brewitt-Taylor, Mrs.	,, ,,
1931	Bright, Percy M., J.P.	Nethercourt, 60 Christchurch Road
1926	Broad, F., F.S.I.	Manton Villa, 2 Oxford Road
1928	Broad, Mrs.	,, ,,
1937	Brodhurst, Miss M.	Blagdon, 14 McKinley Road
1921	Bromley, Miss	81 Lansdowne Road
1935	Brook, E.	72 Parkwood Road, Boscombe.
1937	Brooking, Miss L. W.	Byng Mansions Hotel, Boscombe
1937	Brown, Miss B. L.	Kismet, 28 Keswick Road, Boscombe
1917	Brown, Mrs. Edward	West Ridge, 50 Chessel Avenue
1926	Brown, Lt.-Col. F. Tatton	40 Portchester Road.
1935	Brown, V. A. G.	Flat 17, Mount Heatherbank, Richmond Gardens
1924	Browning, Miss E. M.	Brooklands, Dudsbury Avenue, Ferndown
1905	*Brumell, G., A.R.I.B.A. Hon. Member 1933	Maori, 86 Richmond Park Avenue
1920	Brumell, Miss M.	,, ,, ,,
1920	Bryant, Miss M.	Sunnyhill, Hampden Lane, W. Southbourne
1936	Buchanan Miss M.	27 Cavendish Road
1929	Buckingham, H.	6 Bodorgan Road
1937	Bunce, Miss A.	16 Parkstone Avenue, Parkstone
1937	Bunce, Miss F.	,, ,, ,,
1929	Burge, J. T.	Glenhurst, Braeside Road, West Moors
1927	Burrell, Mrs. A. E.	Freydan Lodge, Poole Road
1924	Burroughs, F. G.	63 Maxwell Road
1934	Burroughs, Mrs. I. F.	High Bank, Braidley Road
1937	Burrow, Mrs. D. M., B.SC., PH.D.	107 Alumhurst Rood
1922	Burton, E. St. John, F.G.S., F.R.S.A.	15 Queensland Road, Boscombe
1922	†Bury, Henry, M.A., F.L.S., F.G.S.	The Gate House, 17 Alumdale Road
1930	Bury, Mrs.	,, ,, ,,
1930	Bury, Miss G. E.	,, ,, ,,
1930	Bury, Miss G. J.	,, ,, ,,
1935	Butler, F. H.	Waverton, Clifton Road, Southbourne
1935	Butler, Mrs.	,, ,, ,,
1937	Butt, Miss E. A.	Eastwood, 7 St. Winifred's Road

C

1928	LCalkin, J. B., M.A.	Wychwood School
1934	Cameron, J., M.D., D.SC.	Balmashanner, Grove Road
1934	Cameron, Mrs. J., J.P.	,, ,,
1919	Cardew, R. K., B.A.	Stafford Lodge, 26 Dean Park Road
1920	Cardew, Mrs.	,, ,, ,,
1932	Carr, Laurence	Newlands, Western Avenue, Branksome Park
1932	Carr, Mrs.	,, ,, ,,
1932	Chambers, W. H.	14 Douglas Road, Southbourne

1912	AChilver, Miss K. M.	2 Shaftesbury Road,
1931	Clark, Miss K. E.	15a St. Mary's Road
1936	Clarke, Miss Bertha, M.A.	64a Parkwood Road
1927	*Clay, R. C. C., M.D., F.S.A.	The Manor House, Fovant, Wilts.
1931	Clegg, J. H.	Mount Pleasant, Bury Road, Branksome Park
1929	Colledge, T. C.	3 Watkin Road, Boscombe
1933	Collings T. G.	54 Parkwood Road, Boscombe
1928	Constantine, M. H.	Brendon, Nairn Road
1935	Cookes, Mrs. L.	Oriel Haven, Victoria Avenue, Winton
1926	Cooper, H. A.	25 Talbot Avenue
1926	LCooper, J. S.	The Little Red House, Colehill, Wimborne
1903	†oCrallan, G. E. J., M.A., M.B., M.R.C.S.	Country House Hotel, Crowborough, Sussex
1922	Crallan, Mrs.	,, ,,
1920	Cressey, Miss H.	14 Percy Road, Boscombe
1931	Crocker, Mrs. Walter	Highridge, Ferndown
1935	Cross, Miss F. C.	59 Strouden Avenue
1934	Croucher, Miss J. M.	Little Stanpit, Christchurch
1937	Cuningham, Miss D.	Lissara, Barrs Avenue, New Milton
1931	Curgenven, Miss A. J.	6 Suffolk Road
1922	Curme, Miss M. E.	65 Lansdowne Road
1928	Curtis, E. A., L.D.S.	Holm Dene, Poole Road
1928	Curtis, Mrs.	,, ,,
1928	Curtis, E. J. B., L.D.S.	,, ,,
1903	*oCurtis, W. Parkinson, F.E.S. Hon. Member 1922	17 Christchurch Road

D

1927	Dacombe, J. M. J.	Gosfield Cottage, Winkton, Christchurch
1933	Daimpré, Rev. I. D. D.	St. Mary's Vicarage, Morden, Wareham
1935	Daimpré, Mrs. G. H.	,, ,, ,,
1932	Davy, Miss M.	6 Twynham Road, Southbourne
1937	Dawes, Mrs. F. E.	24 Parkwood Road, Boscombe
1937	Dawson, W. G.	Redlands, 83 Southbourne Overcliffe Drive
1930	de Castro, H.	c/o Mrs. L. Lyon, Shalimar, Wilderton Road
1926	de Paiva, Miss E.	Sunny Halt, Hamilton Road, Boscombe
1937	Denman, John, D.SC., PH.D	Durham House, 124 Old Christchurch Road
1936	Denton, Miss E.	3 Penrith Road, Boscombe
1935	Derry, Mrs. E. H.	Charnwood, Belle Vue Road, Southbourne
1910	Dodshon, E., LL.B	124 Old Christchurch Road
1936	Downes, Mrs. W.	46 William Road, Queen's Park
1928	Drew, Lt.-Col. C. D., D.S.O., F.S.A.	c/o Dorset County Museum, Dorchester
1923	Druitt, Mrs.	Willow Lodge, Mudeford, Christchurch
1925	Druitt, Miss C. M.	99 Lowther Road
1925	Druitt, Miss C. S.	,, ,,
1928	Dundee, Col. W. J., C.I.E., R.E., F.R.G.S.	38 Portchester Road
1926	Dundee Mrs.	,, ,,
1921	Dunn-Gardner, R. C.	3 Stanhope Gardens, London, S.W.7.

E

1936	Edwards, Charles, M.D.	Lyndon Lodge, 51b Christchurch Road
1936	Edwards, Mrs. H.	,, ,,
1935	Elgar, Rev. A. J., F.Z.S.	Forest House, 1 Grove Road
1935	Elgar, Mrs. E. M. K., F.R.G.S.	,, ,,
1935	Elgar, Hugh	,, ,,
1935	Elgar, Ronald	,, ,,

1922	Ellis, Mrs.	10 Forest Road, Branksome Park
1922	Ellis, Miss W. M.	,, ,, ,,
1937	Evans, John, M.R.S.C., L.R.C.P.	South View, Vectis Road, Barton-on-Sea
1909	Evans, P. H. L., M.A.	Stirling House, 28 Manor Road
1936	Evans, Mrs. S. E.	Bloomfield, 19 Burton Road, Branksome Park
1927	Exon, C., M.A.	12 Douglas Road, Southbourne

F

1919	Farmar, Mrs. K. A.	Whitton Lodge, Stevenson Crescent, Parkstone
1922	Farmar, Miss E. A.	,, ,, ,, ,,
1937	Farmer, Miss A.	2 Berkeley Mansions, Christchurch Road
1927	Finlinson, F. J.	Daneshill, 85 Queen's Park Avenue
1934	Finnis, Miss F. M.	Riversdale, Poole Road, Wimborne
1903	OA Firbank, Miss, LL.A., A.C.P.	5 Buchanan Avenue
1937	Forrest, Miss C. D.	Hiproof, Benellen Road
1925	Fountain, E. D., L.R.C.P., M.R.C.S.	Vron, 30 Mansfield Road, Parkstone
1933	Fountain, Mrs.	,, ,, ,,
1922	Fowler, A. R. W., B.A.	Ardmore Lodge, Ardmore Road, Parkstone
1919	Fowler, Miss M. L.	Lerryn, Chessel Avenue, Boscombe
1933	†Freeman, J. P. Williams, M.D.	Curdridge, Botley, Southampton
1923	Fryer, Miss C. H.	Moulton, 46 Wellington Road
1928	Fulcher, L. W., B.SC.	60 Herberton Road

G

1937	Gallaher, Miss M. L.	60 Surrey Road
1934	Gandy, H. G., C.B.E., D.L., M.A.	Dormy Hotel, Ferndown
1936	Gardiner, Miss F. M.	3 Adeline Road, Boscombe
1926	Gardiner, H. L.	Granville Court Hotel, East Cliff
1934	Geake, W. E.	6 Hathaway Road, Southbourne
1934	Geake, Mrs.	,, ,,
1934	Gibbons, A.	High Mead, Moreton, Dorchester
1934	Gibbons, Mrs. H. M.	,, ,,
1934	Gill, Miss Ida	4 Windsor Road, Parkstone
1929	Goodacre, W., F.R.A.S.	Waratah, Leicester Road
1927	Gorton, B., M.R.C.V.S., M.P.S.	22 Arnewood Road
1921	Gosse, W., M.D., D.P.H.	Langley, Rowlands, Wimborne
1936	Green, J. F. N., B.A., V.P.G.S.	Berkeley Hall Hotel
1937	Green, Mrs. R.	,, ,,
1936	A Grice, Miss W.	Wentworth, Boscombe
1936	Grieveson, Miss S.	24 Surrey Road
1917	Grindley, Miss E. J.	67 Princess Road

H

1931	Haines, Mrs. E. M.	Appleslade, Ringwood
1929	L Haines, G. E.	602 Christchurch Road, Boscombe
1930	Haines, H. H., C.I.E., F.L.S.	Glyn Cogan, Berriew, Mont.
1931	Haines, Miss E. S.	,, ,,
1924	Hall, L. Beeching, F.L.S.	Bryn Aird, Blake Hill Crescent, Parkstone
1937	Hall, Mrs.	,, ,, ,,

1933	Harding, H. F.	Heather Glen, Western Road, Branksome Park
1934	Harding, Mrs.	,, ,, ,,
1934	Harding, G. F.	,, ,, ,,
1934	Harding, Miss G. J.	,, ,, ,,
1937	Harding, R.	3 Portchester Road
1913	Harris, Miss K.	Trescott Grange, Harvey Road, Boscombe
1912	Harrison, Henry	Eden Lodge, 7 Surrey Road South
1933	Harrison, H. W.	Green Pasture, Pennington, Lymington
1933	Harrison, Mrs.	,, ,, ,,
1932	Hatcher, F.	Hillcot, Constitution Hill, Parkstone
1932	*Hatton, Mrs.	Dutch House, Cliff Road, Barton-on-Sea
1920	Hawes, Miss	The Moorings, 27 Nelson Road
1917	Haydon, C. J.	Ben Veula, 29 West Cliff Road
1936	Haylock, S., M.D.	Balsham, Clifton Road, Southbourne
1918	Haythorne, E. C. C.	Forest Lodge, Branksome Park
1934	Hellier, M., O.B.E.	Moorside, 20 Madeira Road
1921	Hellyar, Miss E. F.	Cerne Abbas, 1 Belvedere Road
1932	Hemmy, A. S., B.A., M.SC.	Anarkali, 45 Elgin Road
1917	Henderson, Miss A. J.	Springbank, 22 Fox Road, Greenock
1928	Henderson, Major H. E.	Tall Trees, 21 Wayside Road, Southbourne
1928	Henderson, R. G., M.A., M.B., CH.B. (Aber.), F.R.C.S. (Edin.)	87a Southbourne Road
1932	Henderson, Mrs.	,, ,,
1931	Herklots, Mrs.	Highland House, Highland Road, Barton-on-Sea
1923	Hill, C. S.	Northfield, Chigwell Road
1930	Hilton-Johnson, Miss C.	12 Oban Road
1924	Hoare, Miss E.	Sea Gate, Cassel Avenue
1929	Hooper, Miss M. N.	Southland, Corfe Castle
1928	Horne, Rev. E. H., M.A.	64 Alum Chine Road
1937	Hough, H. L.	38 Shaftesbury Road, Poole
1923	Howell, Mrs. Rees	Cintra, 35a Richmond Wood Road
1937	Huggins, Mrs. F. M.	Wentworth, Crichel Mount Road, Parkstone
1925	Humby, H. G.	Brackendene, 23 Wimborne Road
1936	Hunkin, Miss K. A., B.A.	25 Foxholes Road, Southbourne
1927	Hunt, Mrs. F.	33 Stirling Road
1932	Hunt, Mrs. P.	Cone Cottage, 33 Twynham Road, Southbourne
1937	Hurdle, Mrs. E.	Hadley, 33 Grand Avenue
1930	Hurt, Miss C. E. C. J.	Flat 31, Ingleby, 6 Wimborne Road

I

1905	*Ibbett, F. W., M.A. Hon. Member 1920	Alwyn, 32 Lonsdale Road
1926	Innes, A. A.	Old Pines, Ferndown
1925	Insch, J. M.	18 Beechwood Avenue
1925	Insch, Mrs.	,, ,,
1930	Insch, Miss E.	,, ,,
1930	Insch, Miss S.	,, ,,
1934	Isaacs, G.	Melbury, Lindsay Road

J

1926	Jackson, Mrs. C. M.	The Dakota, Beaulieu Road, Alum Chine
1921	Jackson, Mrs. Gidlow	64 Portchester Road
1933	James, Mrs. M. G.	70 St. Alban's Avenue
1930	Jefferys, J. H.	Elpis, 43 Caledon Road, Parkstone

1923	Jenkins, Miss B. M.	7 Talbot Avenue
1936	Jervois, Mrs. E.	29 Chessel Avenue, Boscombe
1933	Johnson, Miss A. C.	Rivelin, Avenue Road, Christchurch
1930	Jones, Miss A. Parnell	Menstone, Frankland Crescent, Parkstone
1933	Jones, Dr. Felix	7 Surrey Road
1930	Jones, Mrs. W.	1 Park Road
1927	†Jourdain, Rev. F. C. R., M.A., F.Z.S., M.B.O.U.	4 Belle Vue Road, Southbourne
1930	Jubb, Miss O.	12 Oban Road

K

1910	Kay, A. J.	Valliscourt, 100 Lowther Road
1936	Kearne, S. Lindsay, L.MUS.T.C.L.	56 Fenton Road, West Southbourne
1937	Keay, D. D.	4 Berkeley Road, Winton
1930	†*Keeble, Sir F. W., K.B.E., D.SC., F.R.S.	Hammels, Boars Hill, Oxford
1929	Kendall, Mrs.	20 Serpentine Road, Poole
1928	Kendall, Miss G. J., A.R.C.M.	,, ,, ,,
1935	Kerslake, F. C.	Pleasant View, Penywern, Neath, Glam.
1935	Keutgen, E.	Hotel Royale, Gervis Road East
1937	Kidd, D. J.	33 Bath Hill Court
1927	Kilburn, Miss Alice M.	9 Glenmoor Road, Winton
1927	Kilburn, Miss Annie	,, ,,
1936	King, Mrs. A.	37 Linwood Road
1937	Kirkmann, Miss Maud.	26a New Park Road
1937	Kohn, Mrs. Franklin	2 Hengist Road, Boscombe

L

1934	Lawrence, R. L. R.	The Woodlands, Canford, Wimborne
1923	Lawrence, Mrs.	66 Portchester Road
1932	Laxon, E. A.	The Ramblers, Ashley, New Milton
1932	Laxon, Mrs.	,, ,, ,,
1933	Leach, W. J.	43 Browning Avenue, Boscombe
1929	ALee, Miss L., LL.A., F.R.G.S., F.A.G.S.	69 Walpole Road
1930	Lefroy, Mrs.	Kenwood, Sheffield 7.
1910	Lendrum, Miss A. M.	13 Carysfort Road
1932	Leon, Miss N.	Heelde, Stapehill, Wimborne
1936	Leveson, F. A.	4 Grove Mansions, Grove Road
1922	Littleboy, Miss E. S.	2 Bodorgan Manor, 30 Bodorgan Road
1923	Littlewood, Engineer Capt. A. W., R.N., Retd., O.B.E., Chevalier Legion of Honour.	28 Princess Road
1928	Longbottom, Mrs.	Haslemere, Penrith Road, Boscombe
1931	Looker, Rev. William, F.G.S.	50 Queen's Park West Drive
1920	ALove, W. J. E.	17 Castlemain Avenue, West Southbourne
1935	Low, Miss R.	The Toft House, Manor Road
1932	Lowther, F. L., B.A.	Lonsdale, Mayfield Avenue, Parkstone
1934	ALowther, Miss D. M., B.SC.	,, ,, ,,
1903	o*Lupton, Miss	The Cottage, St. John's Road, Sandown, I.W.
1910	Lyon, Mrs. C.	Shalimar, Wilderton Road, Branksome Park

M

1908	Mackay, Miss	8 King's Park Road
1929	Mackay, Miss C. J.	,, ,,
1933	Maclean, Miss C.	16a Walpole Road, Boscombe
1933	Maclean, Miss L.	,, ,, ,,
1937	McArthur, Mrs. H. A.	Ravenscroft, Queen's Park Avenue
1909	McBean, Miss S.	29 Parkwood Road
1932	McDougall, M., M.B., B.S.	8 Dunkeld Road
1932	McDougall, Mrs.	,, ,,
1935	McMichael, E.	1 Branksome Wood Mansions, Branksome Wood Road
1935	McMichael, Miss E.	,, ,, ,,
1920	Male, H. C., M.D., M.R.C.S.	35 Irving Road, West Southbourne
1930†*	Malmesbury, The Rt. Hon. the Earl of, D.L., J.P.	Heron Court, Christchurch
1931	Marsh, W. H., B.SC.	Archways, Mount Pleasant, Ringwood
1936	Marsh, Miss M. F., B.SC.	,, ,, ,,
1913	Martin, Miss F. G.	8 Castlemain Avenue
1934	Martin, Miss H. F.	36 Portarlington Road
1935	Martin, W. P., M.A.	9 Verona Avenue, Southbourne
1921	Mate, Mrs. S. J.	10 Landseer Road
1930	Medwin, Miss G. L., M.B.E.	Alfreda, Broad Avenue, Castle Lane
1937	Mersen, Miss A. M.	46 Sherwood Avenue, Parkstone
1929	Meyrick, Sir George, BART.	Hinton Admiral, Christchurch
1931	Miles, Miss V.	21 King's Park Road
1930	Miller, Dr. A. H.	Branksea Tower, Osborne Road, Parkstone
1926	Miller, Miss W. F., B.A.	Sunnycroft, 15 Penrith Road, Boscombe
1935	Miller, G. Victor, M.D.	Heathlands Hotel, Grove Road
1937	Milne, R. M.	Radegund, Pennington, Lymington
1934	Mitchell, Miss E. A.	109 Edgehill Road
1930	Molineux, A. W.	Wendover, Manor Road, New Milton
1937	Moore, E. J. F., M.D.	8 Grovely Road
1937	Moore, Mrs. L.	,, ,,
1922	Moore, Major T. C., I.M.S.	Sundew, The Bench, Lyndhurst
1931	Morrell, C. Conyers, M.D., (Brux), L.R.C.S., L.R.C.P. (Edin.), D.P.H., F.R.I.P.H., F.R.A.S.	Mudeford House, Christchurch
1931	Morrell, Mrs. I. C., M.R.I.P.H.	,, ,,
1937	Morris, Brig-Gen. G. M., C.B., D.S.O.	Dormy Hotel, Ferndown
1935	Morrison, Mrs. R. P.	The Toft House, Manor Road
1935	Morrison-Bell, Sir C. W. H., BART.	Balcombe Tower, Branksome Park
1935	Morrison-Bell, Lady	,, ,,
1935	Morrison-Bell, Miss D. F.	,, ,,
1935	Morrison-Bell, Miss V. F.	,, ,,
1908	Moss, Miss	The Grange, 52 Westby Road
1929	Mott, Lady	4 Dingle Road
1933	Mott, Miss Agnes	,, ,,
1933	Mott, Miss J. H.	,, ,,
1932	Mullins, Miss D. E. A.	Rosemaryne, 111 Edgehill Road
1937	Mundy, Montague	Culham, Glenferness Avenue
1936	Murdoch, Miss J. C.	3 Rotherfield Road
1935	Muspratt, C. K., B.A., F.R.G.S.	25 East Avenue
1935	Muspratt, Mrs.	,, ,,

N

1936	Nankivell, Mrs. M. R.	St. Columb Porth, Sandbanks
1931	Nichols, Mrs.	Fanling, 58 Stirling Road
1931	Notcutt, E. A.	24 Southwood Avenue

O

1929	Ogden, Miss E.	Southland, Corfe Castle
1910	LOke, A. W., B.A., LL.M., F.G.S., F.S.A.	32 Denmark Villas, Hove, Brighton
1922	Ousby-Trew, Miss	Overthorpe, Michelgrove Road, Boscombe
1929	Owen, H., B.A., M.B., M.R.C.S.	59 Manor Road
1929	Owen, Mrs.	,, ,,
1929	Owen, J. D.	Barnweill, 42 Strouden Avenue
1929	Owen, Miss E. D.	,, ,,
1929	Owen, Miss M. D.	,, ,,
1937	Owen, Lady L. F.	King's Knoll, Clifton Road, Parkstone.

P

1934	Painter, Mrs.	29 Talbot Road
1928	Parry, Miss A. K.	Tilneyhirne, St. John's Road, Boscombe
1934	Parsons, A. J.	Parva, 32, Morrison Avenue, Westbourne
1936	Parsons, Mrs. A. C.	,, ,, ,,
1926	Parton, Miss M. A.	197 Holdenhurst Road
1926	Paterson, Miss N.	Corfe Lodge, Parkstone
1924	Pattinson, Dr. T. W.	59 Wellington Road
1924	Pattinson, Mrs.	,, ,,
1916	Penrose, Mrs.	Woodbury, 9 Grove Road
1916	Penrose, Miss F.	,, ,,
1916	Penrose, Miss M., B.SC.	,, ,,
1929	Phelps, Mrs. J. V.	Woodbury, East Avenue
1934	Pickup, E. A.	24 East Avenue
1937	Pilkington, Dr. F. W.	King's Knoll Clifton Road, Parkstone
1935	Pinder, T.	Dunster, Howard Road
1933	Platten, G.	Rotherfield Kennels, New Milton
1933	Platten, Mrs. A.	Rotherfield Grays, New Milton
1921	Pontifex, R. D.	Dalton House, 68 Christchurch Road
1926	Potter, Rev. Prof. M. C., M.A., D.SC., F.L.S.	Corley Croft, York Avenue, New Milton
1930	Potter, Miss R. M.	Etruria, York Road, Broadstone
1930†	*Prain, Lt.-Col. Sir David, C.M.G., C.I.E., F.R.S.	The Well Farm, Warlingham, Surrey

Q

1922	Quick, R., F.S.A. (Scot.), M.J.S.	Tregenna, Castle Lane
1924	Quick, Mrs.	,, ,,

R

1927	Raine, A. D.	Milverton, Lymington
1927	Raine, Mrs.	,, ,,
1912	*Rankin, W. Munn, M.S.C. (Leeds) B.SC. (Lond.) Hon. Member 1920	Municipal College, Burnley, Lancs.
1917	Ranshaw, Miss E. M.	9 Marlborough Road
1918	Ratcliffe, Mrs.	Brooklands, 32 Branksome Wood Road
1936	Ray, W. T.	24 Alyth Road
1919	Rayner, Miss F.	35 East Avenue
1905	*Rayner, J. F., M.B. MYC. S.	Arlesey, Westerham, Kent

1934	Redmayne, W. T.	Lynford House, Burley, Ringwood
1935	Reid, A. H. G.	29 Newstead Road, Southbourne
1932	Reid, Mrs. F. E. A.	,, ,,
1924	*Reid, Mrs. E. M., B.SC., F.L.S.	Pinewood, Milford-on-Sea
1919	ARichards, Miss E. E., B.SC.	3 Clive, 20 Grove Road.
1928	Richards, Mrs. E. M.	Flat 32, Hampshire Court
1931	Richardson, Miss I. M.	87 Cranleigh Road
1936	Ringrose, B. J.	Farley, Harbridge, Ringwood
1936	Ringrose, Mrs.	,, ,,
1926	Rix, Miss M. E. de B.	Wayside, Stourcliffe Avenue
1916	Roberts, H. Astley, B.A.	Shalvah, Wilfred Road, Boscombe
1918	Roberts, Mrs.	,, ,, ,,
1924	Robertson, W. G. A., M.D., D.SC., F.R.C.P., F.R.S. (Edin.), F.S.A. (Scot.)	St. Margaret's, St. Valerie Road
1934	Robertson, Mrs. M. K. A., M.D., L.R.C.P., F.R.S.G.S.	,, ,,
1929	Robinson, Miss M. H.	Byways, Chaddesley Glen, Canford Cliffs
1929	Robinson, Miss W. A.	,, ,, ,,
1923	Roden, Miss E. M.	12 Walpole Road, Boscombe
1936	Rooth, Mrs. A. V.	Holt Mount, Wimborne
1933	Ross, Mrs. H. G.	Dingwall, Priory View Road, Moordown
1916	Rothwell, Mrs.	c.9 Pine Grange, Bath Road
1935	Rowling, Rev. Canon F.	87 Watcombe Road, Southbourne
1935	Rush, Major J. S.	Somerset House, Bath Road
1935	Rush, Miss C. J.	60 Victoria Park Road

S

1935	Sandison, Dr. J. F. W.	115 Talbot Road
1929	Saunders, Mrs. M. S.	Southernhay, Cambridge Road
1931	Scudamore, C. E., B.A., L.R.C.P.	18 Clifton Road, Parkstone
1914	Sharp, C.	Langdon, Parkstone
1919	Sharp, Miss E.	,, ,,
1933	ASheffield, Miss I. E.	177 Richmond Park Road
1937	Sherwood, Miss H.	264 Charminster Road
1932	Silvester, N. L., M.SC., F.A.MET.S.	East Cliff Hall
1937	Simmons, W. C., B.SC. A.R.C.S F.G.S.	Trigonia, Spur Hill Avenue, Parkstone
1920	Simpson, N. Douglas, M.A., F.L.S., F.R.M.S.	Maesbury, 3 Cavendish Road
1933	Slack, R. W.	40 Strouden Avenue
1934	Slicker, H. K.	133 Seafield Road
1914	Smyth, W. Johnson, M.D.	Killalief, 534 Holdenhurst Road
1922	Smyth, Miss M.	,, ,,
1915	Smythe, Mrs.	Willstead, 22 Cavendish Road
1920	Smythe, Miss D.	,, ,,
1916	Smythe, Miss K. M.	,, ,,
1932	Spence, W. G.	The Shieling, Highlands Road, Barton-on-Sea
1932	Spence, Miss J. G.	,, ,, ,,
1931	Spencer, C. T., F.R.A.S.	21 Alum Chine Road
1909	Spencer, J. F.	Glenthorne, 73 Richmond Park Road
1935	Spring, F. G., N.D.A., U.D.A.	Aboyne, Spur Hill Avenue, Parkstone
1923	Stables, A. D.	Saxthorpe, St. Osmund's Road, Parkstone
1923	Stables, Mrs.	,, ,, ,,
1923	Starr, Col. W. H., C.B., C.M.G., C.B.E.	4 Foxholes Road Southbourne
1936	Stevens, A. G.	Barford Lodge, 40 Seaward Avenue
1916	Stiff, S. J., B.SC.	Norden House, Corfe Castle
1916	Stiff, Mrs.	,, ,,
1916	Stiff, Miss M. J.	,, ,,

1933	Stockdale, Miss K. H.	72 St. Alban's Avenue
1924	Story, F. N.	Storyland, Church Road, Southbourne
1918	G†*Sumner, Heywood, F.S.A.	Cuckoo Hill, South Gorley, Fordingbridge
1928	Sutherland, W.	Silverdale, 20 Penn Hill Avenue, Parkstone
1928	Sutherland, Mrs.	,, ,, ,,
1937	Swanston, Oliver	62 Stour Road, Christchurch
1922	ASymes, H., M.A.	52 Lowther Road

T

1911	Tatchell, Leonard F.E.S.	Swanage
1928	Taylor, Mrs. R. A.	Flat 32, Hampshire Court, Bourne Avenue
1925	AThomasson, Miss M. E.	37 Belvedere Road
1936	Thompson, Miss E.	Holmwood, 30 Bournemouth Road, Parkstone
1928	Thompson, Rev. J. C., F.G.S.	Cragside, Manor Road, New Milton
1929	Thomson, A. G. A., M.A., M.B.	38 Wentworth Avenue, Boscombe
1932	Thomson, Mrs.	,, ,, ,,
1936	Thurley, G. H.	116 The Grove, Moordown
1936	Trayfoot, H. G., M.B.E.	25 Eaton Road, Branksome Park
1936	Trayfoot, Mrs. L. W.	,, ,,
1933	Tucker, C. E.	St. Michael, 46 Seafield Road, Southbourne
1929	Tucker, Mrs. E. M.	39 Hamilton Road
1934	Tuke, Major G. H.	Clare Lodge, Foxholes Road, Southbourne
1914	Twemlow, Miss E. E.	Devon Lodge, 83 Alumhurst Road

V

1918	Vorse, John	Leighurst, Walkford, Christchurch

W

1924	Wadlow, H. J.	The Gables, Queen's Grove, Parkstone
1921	Wales, Miss	The Nook, 4 Ormonde Road, Branksome Park
1921	Wales, Miss N.	,, ,, ,,
1913	Wallace, W. G.	61 East Avenue
1937	Walters, Miss E.	Wharfmead, East Avenue
1936	Waltham, T. Ernest, F.R.H.S.	60 Grosvenor Gardens, Boscombe
1920	LWanstall, W. S.	Del Monte, 6 Roslin Road
1920	LWanstall, Mrs.	,, ,,
1936	Ward, J. A., M.D.	1 Howard Road
1933	Ward, L.	36 Bridge Street, Christchurch
1935	Ward, Rev. W. L. O.	24 Longfleet Road, Poole
1936	Ward, Mrs.	,, ,,
1936	Warlow, Frank, L.D.S.	99 Southbourne Road
1936	Watkin, Ralph	Avila, Spur Hill Avenue, Parkstone
1932	Watkins, H. G.	Leyland House, Osborne Road, New Milton
1930	Webb, Mrs. F. J.	Melbury, 18 Soberton Road
1935	Webb, Mrs. J. A.	52 Christchurch Road
1936	Weekes, Mrs. M.	3 Rotherfield Road
1932	Welch, Prof. J. J.	11 Beechwood Avenue, Boscombe

1928	Welfitt-Nicholls, Miss C	Campions, Sandy Lane, Riverhead, Sevenoaks
1913	Wetherell, Miss M.	Triana, 31 Harvey Road, Boscombe
1920	Wetherell, Miss S.	,, ,, ,,
1918	Whitaker, S.	22 Somerset Road, Boscombe
1924	Whitaker, Miss E. M.	,, ,, ,,
1924	Whitaker, S. E., P.A.S.I.	22 Selwood Road, Addiscombe, Croydon
1920	White, J. R., M.A.	Whitecot, 15 Linwood Road
1931	AWhite, S. J.	7 Gilbert Road
1929	Whiteley, F. W.	The Fells, West Lulworth, Dorset
1937	Willans, Miss C. M.	2 Berkeley Mansions, Christchurch Road
1935	Wilson, Mrs. G. Shaw	Little Drive, Nelson Road
1929	Windsor, Mrs. E.	Cragside, Manor Road, New Milton
1935	AWood, Miss E. B., B.SC.	4 New Park Road, West Southbourne
1920	Woodhouse, Rev. A. P.	Deanhurst, 5 Littledown Road
1903	oWoodhouse, W. J., A.C.P., M.I.H.	29 Twynham Road, Southbourne
1918	Woodhouse, Mrs.	,, ,, ,,
1923	Woodhouse, W. R.	,, ,, ,,
1923	Woodhouse, Miss M. M.	,, ,, ,,
1931	Woods, J. C.	Pine Croft, Rothesay Road
1931	Woods, Mrs.	,, ,,
1930	†*Woodward, Sir A. Smith, F.R.S., F.L.S., F.G.S.	Hill Place, Haywards Heath, Sussex
1932	Wren, G. G.	264 Charminster Road

Y

1935	Young, Rev. A. W.	542 Holdenhurst Road
1929	Young, Miss E.	11 Borthwick Road, Boscombe

RULES OF THE

Bournemouth Natural Science Society.

(As amended, October, 1937.*)*

Title

1.—The title of the Society shall be THE BOURNEMOUTH NATURAL SCIENCE SOCIETY.

Objects

2.—The objects of the Society shall be:

(*a*) The promotion of the study of Science in all its branches, by means of Lectures, Field Meetings, the Reading and Discussion of Papers, the formation of Sections of its members devoted to any particular branch of the Society's work, and in any way that the Council of the Society shall deem advisable.

(*b*) The making of reports on any animal, plant, or object of interest, and the carrying out of the recommendations contained in such reports.

Members

3.—The Society shall consist of Ordinary, Life, Honorary and Associate Members.

Ordinary Members

4.—Ordinary Members shall pay an Annual Subscription of One Pound, due on the first day of October in each Year. The inclusive Annual Subscription for Adult Members of the same family, not exceeding four and residing in the same house, shall be Two Pounds, each Member being elected in the usual manner and each receiving a card of membership. Members living outside a radius of six miles from the Square at Bournemouth shall pay one half the above rates of subscription.

Life Members

5.—The Subscription for Life Members shall be Ten Pounds. Any Ordinary Member who shall have commuted his Subscription, as provided for in this Rule, shall become a Life Member, but shall not by reason thereof have any rights differing from those of an Ordinary Member.

¶ Rules 5a and 5b referred to in the Trust Deed are Rules 19 and 20.

Honorary Members

6.—Any person distinguished in Science or who has rendered any special service to the Society, may be elected an Honorary Member. Honorary Members shall be proposed and elected in the same way as Ordinary Members and shall have the same rights. The number of Honorary Members shall be limited to twenty-five.

Associate Members

7.—Persons may be admitted Associate Members by the Council on account of their scientific attainments or because they are likely to prove useful working Members of the Society. This privilege will usually be granted to School Teachers.

The annual subscription for Associate Members shall be seven shillings and sixpence. They shall be entitled to all the privileges of Membership except that they shall have no power of voting on the affairs of the Society or of holding office.

Proposal and Election of Members

8.—The Ordinary, Life, and Associate Members of the Society shall be proposed by a Member to whom they are known personally or to whom they have presented adequate credentials, and seconded by another Member, and the proposal, in the form following these Rules, shall be sent to the Honorary Secretary. The name of any such proposed new Member shall be posted on the Notice Board of the Society for a period of not less than seven days, after which such name shall be voted upon at the next ensuing Council Meeting, and if two-thirds of the Council present and voting shall vote for the proposed New Member, such Candidate shall become a Member upon payment of the Annual Subscription and shall receive a Card of Membership which is not transferable. Any Member joining during August or September shall receive a Card of Membership to September 30th of the following year without further payment.

Unpaid Subscriptions

9.—Any Members whose subscriptions are unpaid at the end of the financial year (September 30th), after notice in writing to that effect has been given to them by the Honorary Treasurer, shall be reported to the Council, which shall have the power of removing their names from the list of members.

Resignations

10.—Resignations must be in writing and addressed to the Honorary Secretary. Members are liable for all subscriptions which may have fallen due prior to the date of resignation.

Executive Officers.

11.—The Executive Officers of the Society shall be the Chairman of Council, the Deputy Chairman of Council, Honorary Treasurer, and Honorary Secretary.

The President

12.—The President shall be elected annually by the Council and need not necessarily be selected from Members of the Society. He shall be invited to deliver an Address at as early a date in the Winter Session as can be arranged.

Vice-Presidents

13.—Any Member of the Society who has rendered distinguished service to Science or to the Society may be proposed by the Council for election as a Vice-President; and if elected at the Annual Meeting, shall retain office as long as he remains a Member of the Society.

Chairman of General Meetings

14.—At the Annual and Special Meetings the Chairman of Council or Deputy Chairman shall preside. At all other General Meetings (i.e. meetings of general rather than sectional interest) the President or a Vice-President shall take the Chair whenever possible.

Honorary Secretary

15.—The Honorary Secretary or a deputy appointed by the Council with his consent shall perform all the usual secretarial work, shall keep minutes of all Council Meetings, and of the Annual and Special Meetings, and make a synopsis of all other General Meetings. He shall cause the agenda of the Annual and Special Meetings to be sent to every Member seven days at least before each such Meeting. He shall make all preparations for General Meetings and General Excursions, in respect of which he shall collect from each Member his share of the expenses, and therefrom defray all costs of the Meetings or Excursions.* Any surplus of such collections shall go to the General Fund, and any deficit be defrayed out of that Fund. He shall keep an account of all out-of-pocket expenses. He shall give notice of their election to all new members, and register the Sections, if any, to which they ask to belong. He shall furnish copies of the Annual Reports published during their membership to all Members who have paid their subscriptions, to Honorary Members, and to such Scientific Societies as the Council may from time to time appoint to receive them. The number of copies of the "Proceedings" supplied in respect of each family subscription shall not exceed two.

*Note.—Tickets may be returned and the money refunded up to the expiration of the time for taking tickets for any Excursion; after that date, no money can be refunded even if the tickets are not used.

Honorary Treasurer

16.—The Honorary Treasurer shall have the custody of the General Funds of the Society. He shall receive and acknowledge all Subscriptions, and shall issue tickets of Membership to all persons who are duly elected and have paid their Subscriptions. He shall bring before the Council any accounts that are due for payment. He shall prepare a Financial Statement at the end of each Financial Year to be presented to the Council at the Meeting next preceding the Annual Meeting. After presentation of the Financial Statement to the Council, he shall submit it to the Auditors and lastly to the Annual Meeting of the Society.

Council

17.—There shall be a Council of the Society consisting of the Vice-Presidents who have filled the office of President, the Honorary Treasurer, the Honorary Secretary, the Honorary Librarian, the Honorary Editor, the Honorary Curator, the Chairmen of Sections, not more than ten Members elected by the Society and not more than two co-opted Members except those appointed under Rule 18e. Elected members shall hold office for two years, five retiring each year, and all shall be eligible for re-election. In the event of a vacancy occurring through death or any other cause the Council shall have power to appoint a successor to fill the vacancy for the unexpired term of office.

Council

18 (*a*).—The Council shall have the general management of the Society and the control of its funds, and shall elect the President for the ensuing year. At all Meetings of the Council, five shall form a quorum. The Council shall elect its own Chairman and Deputy Chairman for the Year, shall have power to fill up vacancies in its number, and to co-opt not more than two additional members. The Council shall have power to appoint Committees to deal with any business that may be delegated to them.

(*b*) The Chairman, or in his absence the Deputy Chairman, shall have an original and a casting vote at all Meetings of the Council.

(*c*) The Council shall approve of all arrangements for Meetings and Excursions, Sectional or General, before they are inserted in the monthly programme.

(*d*) If any elected or co-opted member of the Council shall fail to attend four consecutive Meetings of the Council, his seat shall become vacant unless the Council shall decide otherwise.

(*e*) The Council shall have power to appoint at such times and for such terms (not exceeding one year) as they think fit, one or more Assistant Secretaries, whose duty it shall be to assist the Hon. Secretary in the performance of his work. The Council shall have power to co-opt such Assistant Secretaries (not exceeding two in number) as members of the Council during their term of office. This power of co-option is to be in addition to that given in rules 17 and 18 (a).

Trustees

19.—The property of the Society shall be vested in Trustees who shall be elected by the Council. The number of Trustees shall be not more than nine or less than three, and they shall respectively hold office until death or resignation, unless removed from office by a resolution of the Council. The Trustees shall from time to time deal with the property of the Society as directed by resolution of the Council (of which an entry in the minute book shall be conclusive evidence), and they shall be indemnified against all liability whatsoever out of the property for the time being of the Society.

¶ This Rule is referred to in the Trust Deed as Rule 5a.

Borrowing Power

20.—If at any time the Society in general meeting shall pass a resolution authorising the Council to borrow money, the Council shall thereupon be empowered to borrow for the purposes of the Society such amount of money, either at one time or from time to time, and at such rate of interest, and in such form and manner, and upon such security as shall be specified in such resolution, and thereupon the Trustees shall make all such dispositions of the property of the Society or any part thereof, and enter into such agreements or arrangements in relation thereto, as the Council may by resolution direct for giving security for such loan or loans and interest thereon at the agreed rate. All members of the Society, whether voting on such resolution or not, and all persons becoming members of the

Society after the passing of such resolution shall be deemed to have assented to the same as if they had voted in favour of such resolution.

¶ This Rule is referred to in the Trust Deed as Rule 5b.

Visitors

21 (*a*).—A Member may introduce friends who accompany him to all parts of the Society's premises except those which are let or in use for a Lecture or Meeting. The Member must enter the names and addresses of such Visitors in the Visitors' Book and sign the entry. Strangers cannot be admitted on presenting a Member's card or letter.

(*b*) A Member may introduce two Non-Members, who accompany him, to any Lecture or Excursion of the Society, but no Non-Member may be thus introduced to more than two Lectures in the Winter Session and two Excursions in the Summer Session, even though introduced by different Members. In the case of Lectures, the introducing Member must enter the names and addresses of the Visitors in the Visitors' Book and sign the entry. In the case of Excursions, the introducing Member must send the names and addresses to the Organiser of the Excursion.

(*c*) A Member introducing a Visitor is responsible for ascertaining that the Visitor has not been introduced twice previously in that Session and also that the privilege is not used for commercial purposes.

(*d*) A Visitor to Bournemouth may, with the approval of the Council, be granted a ticket enabling him to attend the Meetings and Excursions of the Society for a period not exceeding six months at a charge of Fifteen Shillings.

(*e*) The Council shall have power to extend the hospitality of the Society to distinguished Visitors.

(*f*) The Council shall have power temporarily to alter or suspend this Rule or any part of it.

Note.—Nothing in this Rule shall prevent the Chairman of a Section from introducing, at any time, a non-member who offers a communication of interest to his Section.

Charges for Meetings

22.—The Council shall have power to make a charge to Members for admission to any Meeting the holding of which involves special expenses, and may arrange for the admission of Non-Members.

Expulsion

23—The Council shall have power to expel a member from the Society on account of objectionable conduct. This power shall be exercised only at a special meeting of the Council called for the purpose, and particulars of the proposed expulsion shall be given on the notice calling the meeting. A majority of two-thirds of those present and voting shall be necessary to give effect to the expulsion. The member affected shall have the right to appeal to a special meeting of the Society. At this meeting a majority of two-thirds of those present and voting shall be necessary to reverse the decision of the Council.

Annual and Special Meetings

24 (*a*).—The Annual Meeting shall he held in the month of October.

(*b*) At this Meeting the Chairmen of Sections, the Honorary Treasurer, the Honorary Secretary, the Honorary Librarian, the Honorary Editor, the Honorary Curator, five Members of the Council and two Auditors for the ensuing year shall be elected, either Auditor having the power to audit the accounts in the absence of the other. Any member other than an Associate Member of the Society may nominate candidates to fill the vacancies in the Council. Nominations must specify the proposer and seconder and must be in the hands of the Secretary seven clear days before the Annual Meeting, and no such nomination shall be made without the consent of the candidate. Election shall take place by ballot.

(*c*) At this Meeting the Council's Report for the past year, and the Honorary Treasurer's statement of accounts duly signed by the Auditors, shall be submitted.

(*d*) Notice convening an Annual or Special Meeting, together with the agenda and details of any proposed alterations in the Rules, shall be given to Members at least seven clear days before such Meeting is held.

(*e*) On a written Requisition, signed by at least ten Members of the Society, the Council shall call a Special Meeting to consider any question as to the affairs of the Society, such Meeting to be called within three weeks of the Council Meeting next following the receipt by the Honorary Secretary of the Requisition, and at least seven clear days' Notice shall be given to the Members. At such Meeting no other business than that mentioned on the Requisition, and on the notice convening such Meeting, shall be considered.

(*f*) At the Annual Meeting and at all Special Meetings of the Society, not less than twenty-five Members shall form a quorum.

Sections 25 (*a*).—The Council shall have power to form a Section for the study of any special subject deemed within the scope of the Society's work, and shall appoint the Chairman for the first year.

(*b*) The Chairman of each Section shall appoint a Secretary for the Section, who, in addition to the ordinary secretarial duties, shall keep a list of the Members of the Section.

(c) A Section shall consist of those Members who have given notice, in writing, of their wish to be registered as members of the Section, either to the Honorary Secretary or to the Honorary Secretary of the Section. Such registration will not become effective until the expiration of a fortnight from the date that the notice is received.

(*d*) The Members of each existing Section shall, at a Meeting held before the last week in July in each year, nominate the Chairman of the Section for the ensuing year to come into office after the Annual Meeting. The Secretary of the Section shall send such Nomination to the Honorary Secretary in time to present it at the next Council Meeting.

(*e*) If the Council approve of the Nomination, it shall recommend the person nominated for Election at the Annual Meeting, otherwise it shall refer the matter back to the Section. If any Section fails to nominate a suitable Chairman, the Council shall have the right to do so. The final Election shall take place at the Annual Meeting.

(*f*) At the request of the Sectional Chairman the Secretary of a Section may attend Meetings of the Council, but without the power of voting.

(*g*) Each Sectional Chairman shall be responsible for the preparation and arrangement of the Meetings and Excursions held in connection with his Section; and at the end of the session he shall render to the Honorary Treasurer an account of his receipts and payments for the Section.

NOTE.—Tickets may be returned and the money refunded up to the expiration of the time for taking tickets for any Excursion; after that date, no money can be refunded even if the tickets are not used.

(*h*) A Minute Book for each Section shall be kept in which shall be entered details of the Section's work and an account of all Sectional Meetings, with the number of Members attending and notes on any matters of interest observed or discussed. Such book shall be submitted to the Council whenever required. The Chairman of each Section shall send to the Honorary Secretary a report of the Section's work for the year in time for it to be epitomised in the Council's Report to the Annual Meeting.

Alteration in Rules 26. Alterations in the Rules must be sanctioned by a majority of not less than two-thirds of the Members present and voting at the Annual Meeting, or at a Special Meeting called for that purpose, and no alterations shall otherwise be made.

To the Honorary Secretary,

Bournemouth Natural Science Society,

39, CHRISTCHURCH ROAD, BOURNEMOUTH.

Dear Sir,

I beg to propose that

M...

(Please give Christian name in full, and state title—Mr., Mrs., Miss, etc., and any degrees or qualifications.)

Address...

....

**who is personally known to me*
**who has produced satisfactory credentials to me* *be elected an* **Ordinary* / **Associate*
Member of the Society.

Date................ *Member's Signature* ....

I beg to second the above proposal

Date................. *Member's Signature*..............................

*Delete words not applicable.

Annual Meeting, 1937

The thirty-fourth Annual Meeting was held on Saturday, October 30th, at 3 p.m. Mr. Henry Bury, Chairman of Council, was in the Chair, and there was a fairly large attendance of members.

The Hon. Secretary, Mr. W. J. Woodhouse, read the Minutes of the last Annual Meeting, and these were approved and signed by the Chairman. Major Henderson proposed the adoption of the Council's Report and the Hon. Treasurer's Statement of Accounts, both of which were taken as read, and the adoption was seconded by Mr. Lowther, and carried. A vote of thanks to the retiring President, Sir Harold Carpenter, was moved by Rev. F. C. R. Jourdain, and seconded by Dr. J. Cameron. It was then announced by the Chairman that the Council had elected Professor John Cameron President for 1937-38. This announcement was received with hearty applause by the meeting. The election of officers which followed was proposed by Mr. Hayes Barratt, and seconded by Mr. Gandy. This and the election of the Chairmen of Sections, which was proposed by Mr. Buckingham and seconded by Miss Twemlow, were carried unanimously. Three new Vice-Presidents were next elected:—Mr. L. Beeching Hall, Dr. W. G. A. Robertson, and Mr. J. R. White. Their election, proposed by Mr. Brumell, and seconded by Mr. St. J. Burton, was carried with applause. The alteration of certain rules of the Society was carried without dissent, the motion for the adoption of the alterations being proposed by Dr. Robertson and seconded by Mr. Wren. The Hon. Auditors were re-elected on the proposal of Mrs. Rothwell, seconded by Mr. Vorse.

Five members were elected to the Council:—Mr. F. Broad, Mr. de Castro, Mrs. James, Miss M. Penrose and Mr. Wren.

Finally, Mr. Broad moved a very hearty vote of thanks to the Chairman of the meeting, and this was seconded by Dr. Scudamore, and carried with acclamation.

Council's Report, 1937.

DURING the year September 30th, 1936, to September 30th, 1937, the number of members of the Society has remained at about the same figure. Seventy-five new members have been elected, and 54 resignations have been received, the total membership now standing at 494. This includes sixteen Honorary Members, nine Past Presidents, five Original Members, six Life Members, and fifteen Associate Members.

The President, Sir Harold Carpenter, M.A., D.Sc., F.R.S. is to give his Presidential Address on October 16th, having been prevented by ill-health from giving it during his year of office, as he had intended.

The Council has to record with deep regret the deaths of seven members:—Mr. J. H. Scott, an original member, and for some time a member of the Council; Mr. F. L. Gibbs; Mr. C. H. Goodman; the Rev. J. F. Haydon; Mrs. Pontifex; Mrs. Byard, and Colonel de Burgh Birch.

The activities of the Society throughout the year have been many and varied.

During the year there have been held:—

The Annual Meeting
The Presidential Address
16 General Meetings
3 General Excursions
67 Sectional Meetings
44 Sectional Excursions

as recorded in the following list:—

GENERAL.

Lectures and Meetings.

(*Illustrated by Lantern Slides.)

1936.
Oct. **31.**—Annual Meeting.
Nov. **9.**—Club Day.
Nov. **11.**—The Interpreting of Dreams. A. S. Hemmy.
Nov. **14.**—At Home.
*Nov. **25.**—Coral Reefs. H. Bury.
Dec. **21.**—Club Day.

1937.
Jan. **2.**—Children's At Home.
*Jan. **23.**—The Ever Changing River. R. W. Butcher.

Feb. 22.—Club Day.
Mar. 8.— ,,
Apr. 19.— ,,
May 10.— ,,
June 14.— ,,
July 29.— ,,
Aug. 30.— ,,
Sept. 30.— ,,
*Oct 16.—Presidential Address.
Oct. 25.—Club Day.

Excursions and their Leaders.

June 19.—Brympton D'Evercey. S. Whitaker.
July 17.—Embley House. S. Whitaker.
Sept. 8.—Breamore House. S. Whitaker.

SECTIONAL.

Archæological and Historical Section.

1936.
Nov. 6.—Phœnix and Gryphon in History. C. E. Tucker.
*Nov. 7.—Ancient Thebes. J. Cameron.
*Nov. 23.—Silchester. Rev. and Mrs. W. L. O. Ward.
*Dec. 16.—Prehistoric Remains in Minorca. J. Cameron.

1937.
*Jan. 13.—Mohammedan Architecture of India. A. S. Hemmy.
*Feb. 3.—Some Oxfordshire Parish Churches. S. Whitaker.
Feb. 10.—Fairy Tales. Miss M. Penrose.
*Mar. 13.—Oxford and its Cathedral. J. Whitaker.
*Apr. 10.—Excavations (1936) at Maiden Castle. Lt.-Col. Drew.
*Oct. 23—Prehistoric Man in S. Africa. W. G. A. Robertson.

Excursions and their Leaders.

May 27.—Milton Abbas. J. Cameron.
June 28.—Buckler's Hard and Beaulieu Abbey. J. Cameron.
July 23.—Shaftesbury Abbey. J. Cameron.
Aug. 23.—Montacute. J. Cameron.
Sept. 17.—Colliton Park and Maiden Castle. J. Cameron.

Astronomical Section.

Lectures and Meetings.

1936.
*Nov. 17.—Astrophysics and the Ice Age. W. Goodacre.
*Nov. 28.—Sunspots. Dr. Conyers Morrell.

1937.
*Jan. 16.—The Mysteries of Space. J. Blackhall.
*Feb. 20.—Total Eclipse of the Sun (Athens, June 19, 1936). W. Goodacre.
*Mar. 6.—Variable Stars. E. W. Mason.
Apr. 24.—The Astronomy of the Bible.

(A Discussion, opened by W. Goodacre.)

Botanical Section.

Excursions and their Leaders.

1937.
Apr. 13.—Cowgrove and Pamphill. R. K. Cardew.
Apr. 27.—Hinton Admiral. F. L. Lowther.
May 7.—Coombe Keynes. R. K. Cardew.
May 13.—Studland Heath. L. B. Hall.
May 18.—Winterbourne Zelstone F. L. Lowther.
May 25.—Iwerne Minster. H. de Castro.
June 3.—Burley. L. B. Hall.
June 10.—Wool. H. J. Wadlow.
June 15.—Marlborough Deep. J. Vorse.
June 22.—Bloxworth to Bere Regis. H. J. Wadlow.
July 1.—Beaulieu Road. L. B. Hall.
July 9.—Corfe. H. J. Wadlow.
July 13.—Holmsley. J. Vorse.
July 20.—Arish Mell. H. J. Wadlow.
July 27.—Studland and Ballard Down. H. J. Wadlow.
Aug. 4.—Spetisbury. R. K. Cardew.
Aug. 9.—Brockenhurst. J. Vorse.
Aug. 17.—Hod Hill. H. de Castro.
Aug. 26.—Keyhaven. H. J. Wadlow.
Aug. 31.—Wareham. H. J. Wadlow.
Sept. 10.—Holmsley. H. J. Wadlow.
Sept. 14.—Moortown. R. K. Cardew.
Sept. 21.—Charborough Park. F. L. Lowther.
Sept. 28.—Creech Barrow. H. J. Wadlow.
Oct. 8.—Moreton. R. K. Cardew.
Oct. 12.—Brockenhurst (Fungus Foray). Dr. Potter and J. Vorse.
Oct. 21.—Corfe. H. J. Wadlow.
Oct. 28—Brockenhurst (Fungus Foray). Dr. Potter and J. Vorse.

Entomological Section.

Lecture.

1937.
*Feb. 8.—Ants. B. D. W. Morley.

Geographical Section.

Lectures and Meetings.

1936.
*Nov. 18.—Bulgaria. C. K. Muspratt.
*Dec. 2.—Some Dorset Place Names. F. L. Lowther.

1937.
*Feb. 27.—Modern Economic Geography of Canada. A. G. Byard.
*Mar. 10.—The Relation of History to Geography in Dorset. F. L. Lowther.
Mar. 24.—Some Spanish Ways and Customs. R. Watkin.
Apr. 1.—Transport through the Centuries before 1900 A.D. R. K. Cardew.

Excursions and their Leaders.

1937.
Jan. 27.—Poole Fire Station. H. de Castro.
May 5.—Encombe Gardens and Valley. H. de Castro.
June 2.—Minterne Magna Gardens. H. de Castro.
Aug. 11.—Netherbury Court, Beaminster. H. de Castro.

Geological Section.

Lectures and Meetings.

1936.
*Dec. 9.—The Origin of Coral Reefs. H. Bury.

1937.
*Jan. 11.—The Scenery of the Lake District. J. F. N. Green.
*Feb. 13.—Geology and the Community. H. D. Thomas.
*Feb. 24.—The Peak District and its Caves. A. Gibbons.
*Apr. 6.—The Ice Age in Britain. Rev. W. Looker.
*Oct. 19.—Geological Time and the Antiquity of Man. H. Bury.

Excursions and their Leaders.

1937.
May 11.—Dungy Head, Lulworth. E. St. J. Burton.
June 24.—St. Aldhelm's Head. H. Bury.
Aug. 19.—East and West Chaldon. A. Gibbons.
Sept. 2.—Worbarrow Bay. H. Bury.

Microscopical Section.

Lectures and Meetings.

1936.
Nov. 20.—Objects of Interest.
Dec. 18.—The Structure of Plants. M. McDougall.

1937.
Jan. 15.—Objects of Interest.
Feb. 19.— ,, ,,
Mar. 19.— ,, ,,
Apr. 16.— ,, ,,
May 21.— ,, ,,
June 18.— ,, ,,
July 16.— ,, ,,
Aug. 20.— ,, ,,
Sept. 24.— ,, ,,
Oct. 15.— ,, ,,

Photographic Section.

Lectures and Meetings.

1937.
*Jan. 28.—World Experiences. G. Borrett.
*Mar. 17.—Palestine. G. A. Parry.
*Apr. 3.—A Week in Rome. G. W. Bater.
*May 1.—Chester: City and Cathedral. E. Dodshon.
*Oct. 27.—Lincolnshire and Some of its Parish Churches. S. Whitaker.

Excursion and Leader.

May 20.—Bruton and Farleigh Hungerford. S. Whitaker.

Physical Section.

Lectures and Meetings.

1936.
Dec. 5.—Some Phases in the Work of a Public Analyst. F. W. Richardson.

1937.
*Jan. 21.—Newton and the Rainbow. M. McDougall.
Feb. 18.—Alcohol : its Action and Uses. B. Gorton.
*Mar. 12.—Science in Industry : Coal Gas. A. G. Byard.
Apr. 29.—Material Used by Plants. W. H. Marsh and L. B. Hall.

Excursions and their Leaders.

Apr. 22.—Poole Gas Works. W. H. Marsh and A. G. Byard.
July 7.—Avon Motor Tyre Works. W. H. Marsh and H. de Castro.

Zoological and Biological Section.

Lectures and Meetings.

1936.
Nov. 4.—Specimens in the Museum. G. Borrett.
Nov. 21.—The Migration of Birds. E. W. Wade.
Nov. 30.—Old and New Beliefs in Science. (A Discussion.)
*Dec. 12.—Evolution as proved in our own Bodies. W. G. A. Robertson.
Dec. 14.—Unusual Types in Plants and Animals. (A Discussion.)
Dec. 19.—Measuring Intelligence. Miss D. Lowther.

1937.
Jan. 5.—A General Survey of Animals. B. Gorton.
*Jan. 9.—Hungary and its Bird Life. Rev. F. C. R. Jourdain.
Jan. 30.—Mammals I have Met. B. Gorton.
*Feb. 6.—The Flight of Birds. G. Marples.
Feb. 15.—Some Animals of Special Interest. L. B. Hall.
*Mar. 3.—The Bird Life of the Shetlands. Rev. C. J. Pring.
Mar. 16.—Digestion. B. Gorton.
Mar. 22.—1. Symbiosis. 2. Parasites. (A Discussion.)
Apr. 17.—Digestion (continued). B. Gorton.
Oct. 7.—Digestion (continued.) B. Gorton.

The Society has suffered a heavy loss in the resignation of Dr. G. E. J. Crallan, M.A., M.B., M.R.C.S., from the Chairmanship of the Entomological Section, and, as yet, the Council has been unable to find anyone to succeed him. The Council has also regretfully to report the resignation of Professor B. Gorton, M.R.C.V.S., M.P.S., from the Honorary Curatorship, a position which he has held since 1932. His place will be taken by Mr. W. C. Simmons, B.Sc., A.R.C.S., F.G.S.

The Society has let two more of the upper rooms, thus securing a useful addition to its income. The Lecture Hall has been let on several occasions, and this and several other rooms were let during the summer to a party of Swedish students, as in previous years.

A legacy of £100 was received by the Society under the will of the late Mr. Claude Lyon, a last instance of the generosity that he showed to the Society during many years.

Through death and resignation, the number of the Trustees who hold the property on behalf of the Society had, a few months ago, been reduced to one, and the three surviving Trustees for the

Debenture Holders all gave notice of their intention to resign. Accordingly, new Trustees have been appointed, and the full list of them is as follows:—

Trustees for the Society, elected by the Council.

Mr. Henry Bury, Miss M. Penrose, and Mr. W. J. Woodhouse, together with Mr. G. Brumell, the surviving original Trustee.

Trustees for the Debenture Holders, elected by the Debenture Holders.

Miss F. E. Penrose, Mr. W. G. Wallace, Mr. S. E. Whitaker, and Mrs. E. M. Woodhouse.

The Council wishes it to be known that gifts and bequests should be made, not to the Trustees, who are merely the legal holders of the Society's property, but to the Council, which has the control of the Society's funds, through the Honorary Treasurer for the time being.

In conclusion, the Council wishes to thank all those members who have helped the Society in any way during the past year. It would like especially to mention in this respect the ladies of the Tea Committee, whose work is such an important factor in the success of the winter meetings, and all those members who, by distributing the Proceedings by hand, saved the Society a very considerable expense. The Council is also extremely grateful to all those from whom gifts have been received.

FORM OF LEGACY.

The following FORM OF BEQUEST is recommended for adoption by those who may be desirous of leaving by Will money for promoting the objects and work of the Society :—

I give absolutely to the Treasurer for the time being of the Bournemouth Natural Science Society of No. 39 Christchurch Road, Bournemouth, for the general purposes of the Society the sum of £ s. d. free of duty, and I declare that the receipt of the said Treasurer for the time being shall be sufficient discharge for the said legacy.

Summary of Accounts for the Year ending 30th September, 1937.

RECEIPTS.

	£	s.	d.
Current A/c.			
Members' Subscriptions	408	15	0
Donations to General Fund	0	17	0
Special Donation for Payment of Secretary ...	35	0	0
Donation towards upkeep of Garden ...	5	0	0
Rent from Tenants	98	15	0
Letting of Hall, etc.	36	16	0
Donations for Library	0	14	6
Surplus from Excursions	28	4	7
Pennies for use of Telephone	1	2	0
Sale of photographs taken on Excursions ...	0	15	6
Proceeds from "At Home"	1	11	9
Sundry	0	18	0
	618	9	4
Balance from 1936	165	12	6
	£784	1	10

PAYMENTS.

	£	s.	d.	£	s.	d.
Interest on Debentures	151	13	0			
Less Tax	36	19	3			
				114	13	9
Interest on Loans	2	10	0			
Less Tax	0	11	10			
				1	18	2
Income Tax under Schedule D ...				0	4	9
Corporation Duty				2	12	0
Maintenance of the Society's House :—						
Rates	79	0	2			
Property Tax	48	13	9			
Water, Light and Heat ...	61	12	10			
Wages	64	15	6			
Insurances	15	15	3			
Telephone Charge	8	2	11			
Furnishing and Upkeep ...	25	19	11			
				304	0	4
Secretarial Expenses :—						
Printing and Stationery ...	29	6	11			
Postage	22	3	1			
Assistant Secretary	44	1	3			
				95	11	3
Maintenance of Garden :—						
Wages	22	14	6			
Other Expenses	7	11	6			
				30	6	0
Special Expenses of Library ...				6	19	6
Subscription to other Societies ...				1	15	0
Cost of Vol. XXVIII. of Proceedings of the Society				47	19	8
Sundries				1	17	2
				607	17	7
Balance carried forward ...				176	4	3
				£784	1	10

Deposit A/c. Debenture Fund.

	£	s.	d.		£	s.	d.
Balance brought forward	38	8	7				
Interest to Dec. 31st, 1936	0	11	3	Balance on Deposit	38	19	10
	£38	19	10		£38	19	10

Building Fund.

	£	s.	d.		£	s.	d.
Balance brought forward	49	14	2				
Interest to Dec. 31st, 1936	0	14	10	Balance on Deposit	50	9	0
	£50	9	0		£50	9	0

Archæological Research Fund.

	£	s.	d.		£	s.	d.
Balance brought forward	8	9	8				
Interest to Dec. 31st, 1936	0	3	1	Balance on deposit	8	12	9
	£8	12	9		£8	12	9

Redemption Fund.

	£	s.	d.		£	s.	d.
Balance brought forward	5	14	3				
Legacy from the late Mr. Claude Lyon ...	100	0	0				
Life Membership Subscription	10	0	0				
Donation	1	0	0	Redemption of Loan	100	0	0
Interest to Dec. 31st, 1936	0	6	8	Balance on Deposit	17	0	11
	£117	0	11		£117	0	11

G. BRUMELL,
Hon. Treasurer,
1st October, 1937.

We have examined the above accounts with the books of the Society and the Vouchers for payments and certify the same to be correct.

(Signed) FREDERIC BROAD.
(Signed) JOHN C. WOODS.

Bournemouth, 11th October, 1937.

Financial Note.

The balance carried forward this year again includes a sum of £35 given by a generous friend towards the payment of an Assistant Secretary during the coming year. The account for the year just ended shows this amount as received and on the other side the payment to the Assistant Secretary during the year. Income has slightly exceeded expenditure, due to the fact that more of the Society's rooms are now let; this is satisfactory, but it would be more so if we were able to raise the necessary income through increased membership and retain more rooms for our own purposes. The acquisition of another hundred members bringing in an additional £100 a year would be of immense value to the Society.

A legacy of £100 has come to the Society through the kindness of our late friend, Mr. Claude Lyon. This has been used to repay the last of the outstanding loans, amounting to a like sum. The liabilities of the Society are thereby reduced to the amount of the debentures outstanding, £3,370.

Members are referred to the Council's Report for particulars as to the Trustees who hold the premises on behalf of the Society, and other Trustees who look after the interests of the Debenture Holders.

Library Report

The Committee has suffered a great loss by the departure from Bournemouth of Dr. Crallan, whose wide knowledge of various branches of science has been of inestimable value in his office of Chairman, and whose generosity has enriched the library by some 250 volumes including 30 bound volumes of the Geographical Magazine.

The late Mr. Charles Goodman presented 50 volumes, mainly of archæological interest, and other donations have come from Dr. Male, Professor Gorton, Mr. Simmons and Mr. Hemmy; other members kindly supply certain magazines as issued.

Lists of recent acquisitions are posted from time to time in the Library; and it should be generally understood that, under certain easy restrictions, books may be freely borrowed by members.

Report of the Zoological Section.

Observations on Birds in the Bournemouth District from October, 1936, to October, 1937.

By the REV. F. C. R. JOURDAIN, M.A., M.B.O.U., F.Z.S., ETC.

1936.

Hooded Crow, *Corvus c. cornix.* One seen at Beaulieu, Dec. 20 (S).

Crossbill, *Loxia c. curvirostra.* Still comparatively scarce. Noted in Boscombe, August—October; also near Hurn, October (R); heard in Southbourne, October 9th, November 8th and 21st (J).

Snow-Bunting, *Plectrophenax nivalis.* A male with other birds (probably the same species), at Beaulieu, Nov. 1 (S). Two at Wareham, Dec. 6 (S).

Black Redstart, *Phœnicurus o. gibraltariensis.* One Mudeford, Nov. 20 (P).

Lesser Spotted Woodpecker, *Dryobates m. innominatus.* One seen in garden, Bournemouth, Nov. 20 (P).

Merlin, *Falco c. æsalon.* One Poole Harbour, Dec. 19 (S).

Whooper, *Cygnus cygnus.* Six of these birds arrived at Beaulieu about Nov. 15, and at first were generally to be seen on the river and the adjoining meadows near the village (TT). They were very tame and after a time worked down the river to near the mouth and were there at the end of the year.

Gadwall, *Anas strepera.* One, Christchurch Harbour, Oct. 24 (P).

Gannet, *Sula bassana.* Three adults seen (one plunging) off Hengistbury Head, Dec. 11 (CT).

Great Crested Grebe, *Podiceps c. cristatus.* A few off Christchurch Harbour, Nov. 24—25 (P).

Red-throated Diver, *Colymbus stellatus.* Remains of one at Keyhaven, Feb. 16 (S).

Leach's Fork-tailed Petrel, *Oceanodroma leucorrhoa.* One picked up exhausted but still alive on Nov. 12 near Beaulieu, but died soon after and is now in the British Museum (TT). Subsequently others were reported from West Dean and Hurstbourne Priors about the same time.

Manx Shearwater. *Puffinus p. puffinus.* One just off shore, Avon Beach, Nov. 12, probably driven in by gale of previous night (P).

Golden Plover. *Charadrius apricarius.* Forty at New Milton, Feb. 16 (S).

Grey Plover, *Squatarola squatarola.* About a dozen in the Christchurch Marshes early Nov. to 15th (P).

Turnstone, *Arenaria interpres.* Two, Stanpit, May 9 (S).

Sanderling, *Crocethia alba,* 8-9 on shore, Hengistbury, Dec. 6 (P).

Knot, *Calidris canutus.* Two, Beaulieu, Sept. 12 (R, S).

Little Stint, *C. minutus.* Two, Sept. 27 and Oct. 18. Keyhaven (S).

Purple Sandpiper *C. m. maritima.* One near river, Stanpit Marsh, extremely tame, Nov. 15 (P).

Green Sandpiper, *Tringa ochropus.* One at Beaulieu for a fortnight, Nov. 6—20 (TT). Also one Newtown, I.W., July 19, and one at Beaulieu, Aug. 8 (S).

Spotted Redshank, *T. erythropus.* The bird recorded last year on Sep. 12 at Beaulieu stayed till the end of the year (S). One near Wareham, Dec. 6 (S).

Greenshank, *T. nebularia.* One or two stayed at Beaulieu to the end of the year; a flock of twelve, Oct. 18, and five on Nov. 28 at Newtown, I.W. (S).

Grey Phalarope, *Phalaropus fulicarius.* One watched at close quarters on the river Avon, near Fordingbridge, Nov. 7. (C. W. Mackworth Praed.)

Bar-tailed Godwit, *Limosa l. lapponica.* About 100 at Keyhaven, May 3 (S).

Black-tailed Godwit, *L. l. limosa.* One on May 10 and eight on May 24 at Newtown, I.W. Also a few at Beaulieu in late autumn and one up to end of year. Remains of one, Keyhaven, Dec. 20 (S).

Sandwich Tern, *Sterna s. sandvicensis.* Three on May 24 and one July 19 at Newtown, I.W. (S).

Arctic (?) Skua, *Stercorarius parasiticus.* A skua seen in Studland Bay on Aug. 16 (S). (See last year's report, p. 37.)

1937.

From the results of the first eight months it is evident that the rainfall has been considerably in excess of the average, but this applies chiefly to the first three months of the year. The amount of sunshine recorded is also below the average and was very noticeable during the summer months. The scarcity of *Macro-Lepidoptera* was very noticeable. The wintering of six Whoopers at Beaulieu was one of the most interesting events of the season.

Raven, *Corvus c. corax.* This fine species is spreading slowly from the west especially along the coast, where it is not much shot. The breeding stock in Dorset now stands higher than it has ever done during the last half century: at least nine pairs nesting in 1937. Two or three were often to be seen on Stanpit Marsh in Jan. and Feb. (P & J).

Golden Oriole, *Oriolus o. oriolus.* A male was seen on Studland Heath on March 26 (S).

Crossbill, *Loxia c. curvirostra.* A few of these birds are still about the district, but no great numbers. One at Southbourne, Mar. 1 (J); and another in Bournemouth on 2nd (R.W.); again at Southbourne on March 11 (J).

Brambling. *Fringilla montifringilla.* One Somerford, Feb. 7 (P); two on shore Beaulieu, Feb. 28, the only time seen in S. Hants (S).

Cirl Bunting, *Emberiza c. cirlus.* Noted feeding with other finches among seaweed, Pennington, Jan. 30 (P); not uncommon locally: Queen's Park (J); Bransgore and Mudeford (P).

Woodlark, *Lullula a. arborea.* A pair on S. Catharine's Hill, May 6th (P).

Meadow-Pipit, *Anthus pratensis.* A case of "injury feigning" by a bird flushed from a nest with newly hatched young on Parley Common, June 15 (J).

Grey Wagtail, *Motacilla c. cinerea.* Breeds at a good many places in the district. Sopley site unoccupied but nested near Hurn (MJ); also at Mudeford (P), etc.

White Wagtail, *M. a. alba.* Three at Keyhaven, Apr. 25 (S).

Firecrest, *Regulus i. ignicapillus.* A male on Ballard Down, March 26 (R and S).

Red-backed Shrike, *Lanius c. collurio.* Unusually numerous this summer: no fewer than seven breeding pairs in the Forest (BR); nested near East Avenue, Bournemouth (T).

Willow-Warbler, *Phylloscopus t. trochilus.* One bird repeatedly gave a demonstration of "injury-feigning," both from eggs and young at Farley in June (Mrs. B. Ringrose).

Whitethroat, *Sylvia communis.* One instance (not repeated) of "injury-feigning" from young at Farley in July (Mrs. Ringrose).

Dartford Warbler, *S. u. dartfordiensis.* Two favourable springs in succession with few heath fires have raised the numbers of this species considerably. It has bred for at least two seasons on Hengistbury Head (P), and on one of the Bournemouth Golf Courses (J and P). Small parties reported in autumn on Studland Heath and one in Purbeck, Sept. 20 (S). Also noted at Pennington Marsh (P).

Fieldfare, *Turdus pilaris.* Not noted in winter, 1936-37, till the end of January at Mudeford (P). Very scarce : only record a few at Newtown, I.W., on Feb. 7 (S).

Black Redstart, *Phœnicurus o. gibraltariensis.* A hen feeding on the lawn, East Cliff, March 19 (FP).

Sand-Martin, *Riparia riparia.* A white bird with faint breast band seen in vast flock near Wareham, July 28 (S).

Nightjar, *Caprimulgus e. europaeus.* A pair bred in a bit of natural woodland in a garden at Canford Cliffs and was sitting early in June (Miss Cooke).

Green Woodpecker, *Picus v. virescens.* A telegraph post in Dr. Crallan's garden was so damaged by holes made by this species that it had to be replaced. Other poles in the district have also been attacked.

Great Spotted Woodpecker, *Dryobates m. anglicus.* Apparently keep in pairs after the breeding season; a pair at Winkton, Oct. 2 (J).

Wryneck, *Iynx t. torquilla.* One noted at Mudeford, Sept. 26 (P).

Short-eared Owl. *Asio f. flammeus.* One flushed, Hengistbury Head on Mar. 21st, flew out to sea (P).

Hobby, *Falco s. subbuteo.* Three seen together, on the edge of the Forest, May 7th (BR and J). One seen near Wareham in late July and August, preying on the Sand-Martins congregating at dusk (S).

Hen-Harrier, *Circus c. cyaneus.* One reported from Arne in winter, 36-37 (J).

Montagu's Harrier, *C. pygargus.* An unsatisfactory season for the New Forest birds. A male duly arrived, but for a long time there was no sign of a mate and later the birds were much disturbed, so that no young were reared this season (BR).

Buzzard, *Buteo b. buteo.* Four seen on the wing at Creech Barrow, on Sept. 28, probably a family party, reared somewhere in the neighbourhood (FL and FW).

Heron, *Ardea c. cinerea.* The Arne Heronry was reported in 1928 to contain about 112 nests, but a visit on April 12 with Mr. De Castro showed only about 22 nests which looked substantial, while only 11 or 12 birds were put off nests. The reduction in numbers is extraordinary if the 1928 figures are correct.

Whooper, *Cygnus cygnus.* The six birds which wintered at Beaulieu in Nov. and Dec., 1936, were still present near the mouth of the river on Jan. 10th, but must have left soon afterwards (S).

Mute Swan, *Cygnus olor.* Some interesting notes on the courtship of this species were made on Feb. 20 at Christchurch Harbour; 259 counted in the Harbour on June 19 (P).

Pink-footed Goose, *Anser brachyrhynchus*. On Oct. 13 a single bird, identified by its brown head, pink feet, and absence of white on bill, black markings on breast or light shoulders, was seen on Stanpit Marsh (P).

Dark-breasted Brent, *Branta b. bernicla* and Light-breasted Brent, *B. b. hrota*. Six birds at Mudeford on Jan. 29, and ten at Stanpit on Jan. 31, were light-breasted, also one on Stanpit, March 10 (P); while flocks of 40 or 50 which frequented the Hants and I. of W. shores of the Solent in Feb. and March were dark-breasted (S); a pricked bird (subsp?) was seen off Poole Harbour on Feb. 20 (S).

Sheld-duck. *Tadorna tadorna*. Between 70 and 80 seen at Pennington, Jan. 29 (P); three or four broods hatched off in Christchurch Harbour and the young assembled in a compact little fleet, June 20 (P and J), with one pair of adults in charge.

Gadwall, *Anas strepera*. Three (one drake) on Stanpit Marsh, Sept. 13 (P and J); also six at Poole Harbour on Sept. 16 (P).

Garganey, *A. querquedula*. Three (2 drakes) on Avon beach, March 19 (P); three pairs (possibly four) breeding on a ten mile reach of the R. Avon (M-Praed).

Wigeon, *A. penelope*. A few on Stanpit Marshes, Jan. 22 and May 9 (P).

Pintail, *A. acuta*. About 50 in Poole Harbour off Sandbanks Hotel, Jan. 16 (S); a pair Keyhaven, April 18, only noted here in Spring (S).

Shoveler, *Spatula clypeata*. Two, Christchurch Harbour, April 10 (P).

Pochard, *Nyroca ferina*. About 70, Littlesea, Jan. 16 (S); a drake on R. Avon, Oct. 15 (P).

Tufted Duck, *N. fuligula*. A few (up to 10) at Beaulieu in winter months (S); one Avon beach, Jan. 14; a few Keyhaven, Jan 30 (P); Two off Bournemouth, March 5 and 6, and eight on 8th (RW).

Goldeneye, *Bucephala c. clangula*. Two (one adult male), Beaulieu, Jan. 31 (S); a duck at Beaulieu, first week in May, probably a pricked bird (TT).

Scoter, *Oidemia n. nigra*. Two, just inside Poole Harbour, Jan. 16 (S); a pair at lagoon, Mudeford, Feb. 25; drake found dead on 28th, slightly oiled; duck stayed till March 21 (P); duck at same place, Oct. 6 to 15 (P).

Cormorant, *Phalacrocorax c. carbo*, and Shag, *Ph. a. aristotelis*. Mrs. Priestley reports an assembly of at least 600 Cormorants and Shags, old and young, at the Freshwater Cliffs on July 18, as against about 30 pairs of Shags when visited earlier in the season. A Cormorant with the white thigh patch was seen on Jan. 23, and two more on the following day at Mudeford (P).

Red-necked Grebe, *Podiceps g. griseigena*. Two Grebes seen on the flooded water at Christchurch on Feb. 15, seem certainly to have been of this species (SB); one on the lagoon, Avon Beach, Feb. 18 (P); and two in almost full summer plumage off Studland, March 25 (ET).

Black-throated Diver, *Colymbus a. arcticus*. One in Christchurch Harbour, April 30th; one (oiled) washed up dead at Mudeford early in May (P), perhaps the same bird.

Red-throated Diver, *C. stellatus*. A dead oiled bird on Avon beach, Jan. 18 (P).

Grey Plover, *Squatarola squatarola*. One on Stanpit Marsh, Feb. 16—20; another (in summer plumage), May 9 (P); two in Christchurch Harbour, Oct. 13 (P).

Turnstone, *Arenaria i. interpres*. One, Shell Bay, Jan. 2 (R and S); three at Stanpit, May 9; also seen Avon Beach, July 23; and five, Warren Beach, Aug. 25—30 (P); one Christchurch Harbour, Oct. 13 (P).

Sanderling, *Crocethia alba*. Two in Christchurch Harbour, Oct. 13 (P).

Knot, *Calidris c. canutus*. Flocks at Keyhaven, Jan. 27 (P); one, Beaulieu, June 24 (S); one, Stanpit (P and J); six, Sept. 13 (P); and a few at Beaulieu, Sept. 26 (R and S).

Little Stint, *Calidris minuta*. One, Beaulieu, Sept. 26 (R and S).

Wood-Sandpiper, *Tringa glareola*. One, near Wareham, July 16; one, Beaulieu, Aug. 19 (S).

Green Sandpiper, *T. ochropus*. One, Keyhaven, Apr. 4 (S).

Spotted Redshank, *T. erythropus*. One wintered at Beaulieu, last seen April 11. Three in summer plumage, June 24; one changing to autumn, July 8; two on 13 and three on Sept. 18 (S); also three at Beaulieu, Sept. 26 (R and S).

Greenshank, *T. nebularia*. Up to three wintered at Beaulieu; last seen April 11 (S). One, Poole Harbour, Jan. 16; also one at same spot March 20—26, and two, April 3 (S); and one, Newtown, I.W., Feb. 7 (S). One July 19 three at Swineham (BR); first seen Beaulieu, July 29; two, Aug. 19; 4 or 5, Sept. 18; and about 20 on 26th (R. and S).

[Phalarope, *Phalaropus* sp? One seen with Godwits at Mudeford, Oct. 4; from its flight it was probably the Red-necked species (P).]

Avocet, *Recurvirostra avosetta*. Two at the mouth of the Beaulieu R., Aug. 26 (P).

Bar-tailed Godwit, *Limosa l. lapponica*. Only noted in small numbers. One, Keyhaven, and one, Stanpit, May 8 (P);

single birds seen at Beaulieu in winter (S); eight at Stanpit, Sept. 12 (P and J); also on Oct. 4 (P).

Black-tailed Godwit, *L. l. limosa.* One, Beaulieu, Jan. 10. Spring passage began in March; four on 21 March; from this time on always a few; seen on eleven occasions till end of July, maximum 20 on April 11 (S). Three at Beaulieu R., Aug. 27 (P).

Curlew, *Numenius a. arquata.* Quite 200 at the mouth of the Beaulieu R. on Aug. 27 (P).

Woodcock, *Scolopax r. rusticola.* A note in the "Field," from Mr. A. L. Bonham Carter, of Mar. 6, records the shooting of 67 Woodcock at Burton, Petersfield, in four days of which the latest was Feb. 1st. As the Woodcock is a very early breeder, and frequently nests in March, there is little doubt that this represents the loss of breeding pairs. A nest with eggs was found at Whitsbury by a workman, but unfortunately deserted (J).

Lesser Tern, *Sterna a. albifrons.* Although much harried by visitors and dogs, some of the birds at Mudeford apparently brought off young, as they were seen bringing fish in from the sea, and young were on the wing in August (P).

Sandwich Tern, *S. s. sandvicensis.* Two seen fishing and later five resting on rocks on the S. side of the Channel to Poole Harbour on Sept. 4; some also seen subsequently up to Sept. 15 when two were seen (Mr. J. Hay); one flying over Bournemouth on Sept. 5 (MP).

Iceland Gull, *Larus leucopterus.* One seen at Beaulieu near the river mouth and watched for some hours on Jan. 31 (S). It was an almost adult bird and the observer has had other opportunities of studying this species, so that the record can be accepted without hesitation. (See Br. Birds XXX, p. 353).

Kittiwake, *Rissa t. tridactyla.* Several storm driven birds in the Solent in Feb.; about 5 dead on shore, Feb. 28. One at Cowes pier, Feb. 7 and one Southampton Water (S); a dead bird, Mudeford, Jan. 18 (P).

Skua, sp? *Stercorarius.* A very dark bird seen in Poole Harbour, July 12 (S).

RETURNS OF RINGED BIRDS.

Two interesting recoveries of ringed birds have been reported during the year. A Starling, *Sturnus v. vulgaris*, caught by a cat at Wimborne, Dorset, late in January was ringed as an adult on 13 Oct., 1934, on the lighter "Haaks" near Den Helder, N. Holland. A Curlew, *Numenius a. arquata,* picked up nearly dead by a keeper at Beaulieu on Aug. 6, proved to have been ringed at Horby, Scania, S. Sweden, as a nestling on May 26, 1937 (TT); a remarkable flight for a young bird in poor condition.

ARRIVAL OF MIGRANTS.

Tree-Pipit. Apr. 3rd, New Forest (F); 12th, Harbridge (BR); 29th, St. Catharines Hill (P).

Yellow Wagtail. Apr. 4th, Avon Valley (P); 10th, Stour Valley (CT); 11th, Harbridge (BR).

White Wagtail. Apr. 4th, Hengistbury (F); 6th, Cadnam (F).

Red-backed Shrike. May 11th, Harbridge (BR).

Spotted Flycatcher. May 8th, Southbourne (J); 9th, Mudeford (P).

Chiffchaff. March 24th, Parkeston (L); 28th, Mudeford (P); 30th, Harbridge (BR); April 3rd, Southbourne (J).

Willow-Warbler. April 4th, Harbridge (BR), and Hengistbury (F); 5th, Mudeford (P).

Wood-Warbler. Apr. 6th, Mudeford (P); 14th, Cadnam (F).

Grasshopper-Warbler. April 11, Bournemouth (F); 19th, Mudeford (P); 24th, Harbridge (BR).

Reed-Warbler. April 12th, Calshot (P); Romsey (F); 21st, Cadnam (F).

Sedge-Warbler. April 14th, Romsey and Bournemouth (F); 17th, Avon Valley (CT); 20th, Cadnam (F); 23rd, Avon Valley (P).

Garden-Warbler. April 20th, Burley (F); 21st, Romsey (F); 24th, Mudeford (P).

Blackcap. April 10th, New Forest (F); 13th, Southbourne (J).

Whitethroat. April 12th, Southbourne (CT); 23rd, Mudeford (P); 25th, Harbridge (BR).

Lesser Whitethroat. April 14th, Bournemouth (F); 20th, Cadnam (F).

Wheatear. March 18th, Keyhaven (P); 29th, Hengistbury (F); April 3rd, New Forest (BR).

Whinchat. April 14th, Cadnam (F); 27th, King's Park (P).

Redstart. April 27th, Hengistbury (B); May 1st, Bournemouth (P).

Nightingale. April 13th, Lymington (F); 15th, Romsey and Cadnam (F).

Swallow. April 7th, Mudeford (P); 11th, Bournemouth (F); 12th, Arne (J); 13th, Lymington (W).

Martin. April 11th, Lymington (RW); 14th, Bournemouth (F); 17th, Sopley (P).

Sand-Martin. April 3rd, St. Catharine's Hll (P); 4th, Hengistbury (P and F); 11th, Harbridge (BR).

Swift. April 16th, Mudeford (P); May 4th, Romsey (J and BR).

Nightjar. May 19th, Stoneham (P); Hengistbury (CT).

Wryneck. April 18th, Bournemouth (F).

Cuckoo. April 12th, Harbridge (BR); 15th, Mudeford (P); 19th, Lymington (F).

Hobby. May 5th, New Forest (BR); 7th, (J).

Montagu's Harrier. April 26th, New Forest (BR).

Turtle Dove. April 30th, Harbridge (BR); May 8th, Southbourne (J); 10th, St. Catharine's Hill (P).

Sandpiper. April 14th, Bournemouth (F); 27th, Stanpit (P).

Whimbrel. April 28th, Stanpit, (P and J).

Lesser Tern. April 27th, Mudeford (P).

Corncrake, May 11th, Mudeford (CT).

Abbreviations :—B=Mr. Brewer; SB=S. D. Barfoot; F=Field (newspaper); J=Rev. F. C. R. Jourdain; MJ=Miss M. Jellicoe; FL=F. L. Lowther; MP and FP=Miss M. and F. Penrose; P=Miss C. Popham; BR=Mr. and Mrs. B. J. Ringrose; R=K. B. Rooke; S=S. D. Smith; TT=Sir T. H. C. Troubridge; CT=C. E. Tucker; ET=Miss E. Trotter; W=R. Watkin; FW=F. Wadlow. Other contributors to whom thanks are also due are Miss Cooke, Mrs. Priestley and Messrs. C. W. Mackworth-Praed and J. Hay.

Presidential Address, 1936.

The Structure of Metals.

By Sir Harold Carpenter, M.A., D.SC., F.R.S., ETC.

It is generally held that the first specimens of the genus **homo** appeared on this planet about a million years ago during the Pliocene period, and further that about half a million years later the differentiation of the species **sapiens** had taken place. Man's life has therefore covered a period of about half a million years. The evidence available indicates that he has only known the use of metals for some 5,000 to 6,000 years. If this is correct it shows that during 99 per cent. of his existence man has been entirely ignorant of metals, and that for 98 per cent. of the remaining 1 per cent. he used them only scantily. If his 500,000 years of existence is compared to 50 years in the life of an individual, it follows that he is now in the position of a man of 50 who began to take an interest in metals three or four days ago.

The distinguishing characteristic of prehistoric man, which set him on the road to a higher destiny, was his ability to make and use tools. Prior to the metal age, in the epoch generally referred to as the stone age, his primitive tools were composed of flints, bones, coral, shell, horn and wood. Possibly the earliest tool was a hand-axe formed by flaking a flint into an appropriate form. Rickard, in his recently published work "Man and Metals," mentions that when Captain James Cook first visited the islands of the Pacific, he found the natives using only non-metallic implements of the type just mentioned. He also mentions that when primitive man was seeking for stones which he could fabricate into his crude implements, he also, like a child, collected the pretty or curious ones for stringing into a necklace and fashioning into a fetish. The early voyageurs in the Lake Superior region state that the Indians regarded lumps of native copper which they found on the ground as divinities, or as presents given to them by the gods that dwelt beneath the water. No doubt the attention of the aboriginal was attracted by the lustrous pieces of gold to be found in the beds of the rivers and streams, for this, although a rarer metal, is widely distributed. He would later learn to shape them by hammering; but this metal is soft and malleable at atmospheric temperatures and is not hardened by hammering and consequently cannot be made into tools.

The discovery of copper would be later than that of gold, for the pieces of native copper found on the earth are invariably covered by a coating of purplish green or greenish black which conceals their metallic lustre. Whenever primitive man tried to shape these coloured stones by chipping, he would find this impossible, but his efforts would reveal the characteristic lustre of the metal, and he would find that, like gold, it could be beaten into shape by hammering. Here again no doubt the metal would first be used for making ornaments, but when it was realised that hammering progressively increased the hardness, its utilisation for simple tools would follow. The red stone thus became more useful than the yellow one. One celebrated boulder of copper found along the Ontonogan River, and now in the Smithsonian Museum at Washington, weighs nearly three tons. Close to it were found numerous stone hammers, and the boulder bore many chisel marks. Abundant evidence is now available that the early tools of copper were shaped by deforming them plastically. In this way primitive man discovered a second method of shaping his tools, not by fracture as in flaking, but by deformation. The coloured stones were plastic and man became, as we should say, a metal smith.

The great majority of metals that we know to-day do not, however, exist in the native state like gold, silver and copper. They are all more or less oxidisable, and occur in the earth's crust as oxidised substances in the form of ores, which do not possess the properties of metals at all. And the true metal age did not begin until primitive man had found how to convert the earthy ore into a plastic metal. It is this discovery which rendered mankind independent of the limited supply of native metals, and made available to subsequent generations the vast supplies of ores from which the metals and alloys of to-day are smelted, refined and fabricated. The importance of this discovery comes into the same category as the first method of producing fire artificially. It seems probable that the art of metallurgy was born at the edge of a camp fire. This was the way in which heat was used most frequently by primitive man. When doing so he placed stones to enclose his rude hearth. It is possible that, in a copper region, one or more of these stones contained copper as an oxide or a carbonate, and that the charcoal of the fire reduced the mineral to metal. Fortunately, we need not conjecture as to the probability of such an accident, for F. E. Studt, geologist to the Tanganyika Concessions in the Katanga province of the Belgian Congo found beads of melted copper and fragments of copper ore that had been reduced in the camp fires of the natives. This happened " frequently " he said. When asked what " frequently " meant, he replied, eight or ten times. We are warranted therefore in concluding that in a copper region such an accident could happen sufficiently often to give primitive man the hint required to connect the idea of heat with the idea of fusibility. From this discovery were evolved in due course methods of melting copper in a simple form of furnace, and then casting it in a mould. At first the castings took the form of thick sheets in open moulds of sand, as the earliest copper adzes suggest, for these, according to Petrie, are flat and of almost uniform thickness, except at the edge where they were both shaped and hardened by hammering. Gradually, from these, other forms of moulds were evolved, in which the metal was cast in more complicated shapes. The use of copper for tools enabled man to clear the forests more rapidly, to grow better crops, to build better buildings, to construct safer boats, and its use for weapons made him a more deadly adversary in his combats with animals and with others of his kind.

From these early beginnings the production and use of metals and alloys has developed to such an extent that it is recognised that they have had a most important effect on man's progress from barbarism to civilization. So dominating indeed has been their influence that it is customary to measure man's advance in civilization in terms of the metals with which he gradually became acquainted. His most striking achievements depend, either wholly or to a large extent, either directly or indirectly, on the use of metals. Ships, bridges, railways, locomotives, automobiles, submarine cables, power stations, electrical distributing systems, aeroplanes, telegraph and telephone systems and broadcasting apparatus are among his most conspicuous creations. Enumeration of such obvious achievements, however, gives only a very inadequate picture of the contribution of metals to the service of modern life, and even when mention has been made of metallic articles of personal, domestic and artistic use which find application at every turn, the most important applications of metals have still to be stated, for the principal service which they render is in the construction of the machinery on which modern life and industry so largely depend.

The material achievements of metallurgy constitute, however, only a part of its service to human life and industry. It was in the practice of this art more than any other that man developed those mental attributes which are the foundation of science and modern thought. Whereas in most of the early arts, such as crop raising, stock breeding and fishing, the human contribution to the process seemed almost incidental, in metallurgy it was an essential feature. From the practice of this art man acquired the mental habit of inquiring into the phenomena that occurred, so that he might attain greater control over them, and with this over nature also. Even this, however, does not complete the story. The intellectual and cultural life of to-day has been developed in many ways; but it would have been impossible without the introduction and development of the metal printing-press, and the consequences which have followed from that invention. Furthermore, to the early metal worker, impressed as he must have been by the wonderful qualities of the metals with which he laboured, the word came to suggest many desirable properties such as strength, solidity, durability, efficiency and trustworthiness. The phrases " as strong as iron," " as true as steel " and " as pure as gold," which have originated in this way, show that the qualities of metals have come to be regarded as standards of conduct, and have become part of the moral fibre of the human race.

Hitherto I have been speaking only, and in the briefest ossible fashion, of the discovery and production of metals and alloys, and their influence on human civilization. With the development of the scientific habit of mind, however, it is only natural that these wonderful substances should have become the objects of scientific study. It is always difficult, and indeed impossible, to date a particular science, because it begins so gradually and in such a disconnected way, and results from a number of more or less casual observations. The earliest recorded observations on the structure of metals date back less than 300 years. One of these is contained in a book entitled "Micrographia," published by Robert Hooke in London in 1665, which is about the time that the Royal Society was founded. He described the appearance of lead crystallising from its alloy with silver. He drew and described the magnified surface of a polished steel plate, and added some thoughtful remarks on the nature of polish. But it is only in the last 50 years that systematic attempts have been made to study the structure of metals and alloys, and to find out as much as possible about the nature of the particles of which they are composed, and how these alter during the varied processes which metal manufacturers employ to-day. This is the subject of my address to-day.

Surface Structures.

Metals and alloys which have been previously melted in suitable furnaces are poured, while still in the liquid condition, into what are called moulds, i.e., enclosures made either of metal or of sand, in which they are allowed to solidify. We can find out something about the structure of a metal by following the process of freezing on its surface. Solidification begins at the sides of the mould and proceeds inwards, and when the temperature has fallen sufficiently it also begins in the liquid itself. The first slide **(No. 1)** shows the structure thus formed in the case of the metal antimony. This beautiful pattern is the result of the freezing of the metal in particular directions. You will notice three long spikes nearly parallel to one another in a roughly vertical position on the slide. They are the first to be formed, and are called the primary crystallites. There comes a point when a number of arms begin to grow at right angles to these. There are quite a number of them, and growth continues until they meet one another. You will notice the irregular boundary thus formed. When this has taken place no further growth can continue in this direction. These are known as secondary crystallites. After this a large number of thin spikes start to grow from these, and they ultimately meet one another, forming the extremely fine and intricate pattern shown in the slide. These last are known as tertiary crystallites. The metal is forced in this way to crystallise in one plane, viz., that of the liquid metal. The slide shows three crystals of antimony built up in this way consisting of primary, secondary and tertiary crystallites. There is a slight volume change connected with the process of freezing, and the metal contracts, thus removing it from the liquid. That is why we know that this pattern represents the first stage of crystallisation. Actually the process is very similar to that of the freezing of water on window panes during a cold night, as a result of which the so-called frost patterns of ice are produced. These result in an exactly similar way.

The next slide **(No. 2)** shows several crystals of another metal, called tellurium, in which the growth of the crystallites is equally evident. In this case the pattern produced resembles that of several ferns. Here also you will notice that the meeting of the secondary crystallites has produced a rough irregular boundary between the crystals. The dark spots are actually minute cavities between the crystallites. The third slide **(No. 3)** shows the surface structure of the metal tin, and here also the primary, secondary and tertiary crystals are evident. In this way beautiful patterns are formed on the surface of the molten metals as they solidify, and they are true crystals, although they do not present the smooth surface which we are accustomed to associate with a crystal of, for instance, such a substance as rock salt or quartz. But the patterns are not always sharp as shown in the three previous cases. The next slide **(No. 4)** shows the surface structure produced by the freezing of an alloy known as Admiralty bronze. You will notice that although it consists of crystallites they are rounded. The general direction is clear, but the spikes of the crystals are not sharp. These also are true crystals, and the rounding in the case of such material is simply due to the fact that, at the temperature at which they are formed, a force known as surface tension is tending to round off the sharp corners and angles of the crystals. It is the same force as is operative in the formation of drops of water. In the case of this particular alloy the result makes them resemble crystals of snow.

But what is happening in the interior of the liquid all this time? There is a quite simple experiment which can be carried out, which enables us to answer this question. If we melt some of the metal in a crucible, and then allow it to cool and partially to solidify, i.e., until a crust is formed over the surface of the metal, but if, before solidification is complete, we break the crust and pour off the still liquid interior metal, we then find the crystals which have grown from the walls of the mould with which the liquid was in contact. The next slide **(No. 5)** shows the result in the case of the metal bismuth. You will notice that it looks like an intricate pattern of steps, and that is what it is, and the form you see there is known as the skeleton cube. This shows that, when a metal grows along the axes, the filling up process at the solid angles produced by the primary, secondary and tertiary axes does not keep pace with the growths along the axes themselves, and this is one of the most striking differences between the crystals of metals and alloys on the one hand and those of salts and minerals on the other.

Remarkable crystals of this kind are obtained in the cavities formed at the top of large steel ingots, where the shrinkage of the metal in contact with the mould produces a cavity under the skin, and relatively large dendritic crystals are thus obtained. The next slide **(No. 6)** shows one of these in the case of a steel ingot, which is known as the pine-tree type of crystallisation. You will notice that, instead of the crystal having a smooth surface, it is indented at numerous places, owing to its quicker growth along certain axes, as a result of which the filling-in process at the solid angles lags behind. As you will see, this particular crystal is more than six inches high. It is clear, then, that metals on freezing produce a very characteristic type of structure whether on the surface or in the interior, which differentiates them from the crystals of minerals and salts; but they are true crystals none the less.

Interior Structures.

But after all the process of solidification in the liquid metal goes through to a finish, and it ultimately cools to the ordinary temperature. If no mechanical work is done upon it it is called a casting, but if, as is more usually the case, it is worked in some way, for instance, hammered, rolled, forged, pressed, extruded, etc., it is then known as a worked metal or alloy. Our next problem is to examine the structure of the metal in its interior and this is not quite so simple, for it demands a special technique both of preparation and of examination.

Preparation of a Specimen for Microscopic Examination.

If we wish to examine the interior structure of a metal in the form of a bar, provided it is ductile or malleable we can shape the specimen by sawing. If on the other hand it is too hard for this process, it has to be ground to shape. In any case, we aim at preparing a specimen of about $\frac{1}{2}$-$\frac{5}{8}$ inch in cross section and about $\frac{1}{4}$ inch in thickness. If we wish to examine the variation in structure which is liable to be found at the surface itself we must then include this in our specimen, but normally, when it is desired to examine the interior structure of a metal, this is not necessary.

Having shaped our specimen we then file it so as to get roughly a level surface. Then comes the first stage, viz., the grinding of this so as to produce a level surface with very thin scratches. This is done by rubbing the specimen on a series of emery papers of successively increasing fineness, so that the scratches produced on one paper are removed on the next. In order to be quite sure of this it is customary, when passing from one emery paper to another, to turn the specimen through a right angle, and this you will see from my next slide **(No. 7),** which shows the results of this method. At the end of this stage, which can be produced after rubbing on three or four emery papers, we then have a level metal surface with a number of fine parallel scratches.

The next stage is to remove these by polishing, and this is done—it is an art—by holding the specimen lightly on a rotating block, covered with a cloth medium to hold the polishing powder, which is kept moist by drops of water. The most usual polishing powder used consists of alumina, but rouge and oxide of chromium are also used. For very soft metals, which are particularly difficult to polish, the oxide of magnesium is most suitable. In the hands of a skilled polisher, three or four minutes polishing should be sufficient to remove all the scratches, and at the end of this time we should have a mirror-like surface of the metal, which shows no structure whatever. The processes of grinding and polishing are essentially different. The grinding action is essentially one of cutting, while during the polishing the surface of the metal flows, and , as we know from some recent investigations in the subject, may actually melt.

Accordingly we now require the third stage of preparation, which consists in removing this flowed or melted layer on the surface of the metal, and this is usually done by what is called etching, which consists in dissolving the metal in a suitable solvent. This also is a process which requires skill and experience, because, while it is necessary to remove sufficient of the surface to get down to the true structure of the metal underneath, it is fatal to good results to remove too much of it, because the surface then becomes unlevel and is difficult to focus. A suitable etching reagent must not act too quickly. It must allow the process to be interrupted at any desired stage. The result of the etching is to destroy the mirrorlike surface, and to cause a scattering of the light, due to the fact that the crystals thus revealed are reflecting the light according to their particular orientations.

For microscopic examination the specimen is then mounted in the simple device shown in the next slide **(No. 8).** The polished and etched surface is placed face downwards on a glass plate within a brass ring with parallel sides. A lump of plasticene is then pressed upon it, and a glass slide pressed down on this until it makes contact with the top of the brass ring. The slide and specimen are then lifted out, and in this way parallelism is obtained between the top of the specimen and the bottom of the slide. Inasmuch as all metals are opaque, they cannot be examined microscopically by transmitted light. They must be viewed by reflected light. This involves a special form of instrument, as a result of which the light is brought through what is known as a vertical illuminator placed between the microscope tube and the objective. It comes down through one side of the objective, is internally reflected by a 45° prism and focussed down on the specimen **(No. 9).** The reflected beam then passes in a parallel direction from the specimen up through the other side of the objective, and is received in the eye-piece, where the image can be viewed. Other methods of illumination are available which differ in detail only. In all of them the light is reflected from the surface of the specimen up through the objective, instead of coming from below as in the case of transmitted light used in studying transparent substances.

Examination of Interior Structures.

We are now ready to begin the study of some interior structures. Let us start with the metal iron. The next slide **(No. 10)** shows the structure of a lightly-etched specimen as a slide-magnification of 150 diameters. You will notice that it does not appear to be crystalline at all. It consists of a series of polyhedra, the boundaries of which are more or less curved. The number of sides varies. One of them has four, another five, another seven and so on. The thin dark lines that we see are the boundaries of what are true crystals, and these have grown in a way which is made clear in the next slide **(No. 11)**. This is not a photograph of a structure but a sketch to illustrate how growth takes place. It starts in the same way as on a liquid metal surface. A number of primary crystallites separate from the liquid and grow in various directions. Presently secondary crystallites appear at right angles, and these grow and gradually reach out and meet other secondary crystallites. In this way boundaries are formed, and these boundaries are what are seen as the lines in the previous slide. Once the boundaries are formed, further solidification takes place along tertiary crystallites and at the solid angles thus set up, and ultimately all the liquid freezes in this way. When we are dealing with a pure metal such as iron, we do not see any traces of these crystallites, because the material is homogeneous. But in the case of certain alloys of two metals, the crystallites which first separate do not have the same composition as the liquid itself and this crystallisation changes the composition of the remaining liquid. Successive portions of the liquid continue to freeze, and these also differ in composition from the remainder. Ultimately therefore we are left with the solid, whose composition varies from the interior to the boundary. When we etch this we see the evidence of an alloy of differing composition, and we get in this way a dendritic structure as a result. This is clearly seen in the next slide **(No. 12)**, which is the structure of brass, an alloy of copper and zinc. You will notice the dendrites are dark, and these are richest in copper and were the first to separate. The filling-in material is richer in zinc, and this has etched light. If now we heat such an alloy, the differences in composition begin to equalise out owing to the diffusion of the two metals, and ultimately we obtain an alloy of homogeneous composition. If we etch this we find that the dendritic structure has disappeared and is replaced by a structure very similar to that of the iron which I just showed you. By analogy we have good reason for thinking that a pure metal crystallises in a similar way; but remember that the evidence is not direct.

Returning now to the structure of the iron, the question may be asked, what exactly are the black lines? I have already said that they represent the boundaries between the crystals, and so they do, but actually we know that they are sloping surfaces, and that is why they appear dark and not light. Remember the light from the illuminator is incident vertically on the surface and represents the crystals as light. The fact that the boundaries appear dark means that they have reflected light outside the microscope tube, and are therefore sloping. The reason why they slope is that the etching material dissolves adjacent crystals at different rates. One crystal is either a little lower or a little higher than the next, and so the surface connecting them slopes either up or down. We know that this is the case because, if we employ oblique illumination and get the proper angle of incidence, these lines at the correct angle of incidence appear light and the crystals themselves appear dark. They are not, as they look at first sight, thin cracks.

The next slide **(No. 13)** shows another example of the crystallisation of an alloy viewed under oblique illumination. It is an aluminium bronze. You will notice that two or three of the crystals show the dendritic structure within the crystals themselves Here again the crystals consist of polyhedra. The central one is light, three of the others are dark, and the remainder are of an intermediate tint. How is it we get this structure? The answer is, that the etching reagent has dissolved sufficient of the surface metal to lay bare the minute facets of which the crystals are composed. The facets of the central crystal are evidently so placed that they reflect the incident light up the tube. Those of the dark crystals are so placed that they reflect the light outside it, while the remainder are, as we say, oriented, so that they reflect some of the light up the tube and the remainder of it outside.

Now let us carry our etching further and remove even more of the surface metal. When we do this we can see the facets of the crystals very clearly. The next slide **(No. 14)** shows the structure of an alloy of iron in which this has been done. We have in the field parts of three crystals. You will notice the boundary lines between them, which are not quite straight. Within a given boundary the facets are all oriented similarly, but they change in direction when we pass to the next crystal. A similar effect is seen in the next slide **(No. 15)** in which we are looking at a part of one crystal. All the facets are similarly oriented. They appear as minute squares in the slide and are sections of cubes. (In addition there are two irregular areas which are due to a small quantity of gas in the specimen). These two slides show in a very clear way the crystalline character of the polyhedra of which metals and alloys are composed. A very striking effect of a somewhat different kind is shown in the next slide **(No. 16)** which represents the structure of the metal silver, in which we are looking at a crystal in the centre of the field which has been etched, not by solution, but by heating at a high temperature. The metal evaporates more from certain planes than from others, and in this way a pattern is produced of the very striking character shown.

Methods of Showing Crystal Structure by Straining.

Slip Bands.

We have other methods of showing the crystalline character of the polyhedral crystals of which metals and alloys are composed. One of the simplest of these is to strain them, i.e., to exert a force upon the metal so that it is distorted. When we do this and examine the result, we find that the metal does not yield uniformly, but moves more easily along certain planes than others. The result is clearly shown in the next slide **(No. 17)**, which is that of a strained brass. The alloy has been mechanically etched by this strain. The polyhedra are evident. In each a large number of parallel lines which run either in one or more directions are seen. These are the so-called slip bands, along which the metal has yielded under stress. They are not cracks as one might at first be inclined to suppose, but are little steps on the polished surface, produced by slipping. These again we can show by finding the proper angle of incidence of oblique light, when they will appear light on a dark ground. These slip bands are traces of the movement of the metal, along slip or glide planes which are definitely related to the crystal structure of the metal. Where the lines are all parallel on one crystal, it means that the slip has been in one direction. Where there are two sets of lines, slip has taken place in two directions, and so on. This is very clearly seen in the next slide **(No. 18)**, which is also that of brass. The large crystal which occupies the bulk of the field has slipped in two directions, whereas the one just below it has slipped only in one.

Where we get systems of slip lines crossing one another we find, when we view them under high magnification, that they are displaced through a definite angle. This is clearly seen in the next slide **(No. 19)**, where we have two systems of slip lines crossing one another at an angle of 45°, and you will notice the quite marked lateral displacement of the line of slip.

Twin Crystals.

In addition to the methods of yielding by slip, there is another one known as twinning. This is not characteristic of all the metals, but only of some. Whereas displacement by slip is characteristic of almost all, if not all, metals, twinning is a movement of rotation which only occurs in some of them. It is seen very clearly in the mineral gypsum, where examples on a large scale are found in nature. These have been produced by stresses in the earth's crust. We get the same phenomena in some metals, and the next slide **(No. 20)** shows twinning of a very characteristic type in tin. We have one crystal occupying the greater part of the field. In it you will notice a number of dark, rather broad parallel bands. These are twins of the metal, produced by its rotation through a definite angle under stress. At right angles to these you will also notice another system of twins which appear light. The two systems etch differently because they are differently oriented. The surface of the specimen in the next slide **(No. 21)** shows twinning in the metal zinc. Here again we have two systems of twins, roughly speaking at right angles to one another. You will notice how broad the bands are. Comparatively large " blocks " of the metal have moved during the twinning process. Occasionally we get a system of twins running in three directions, and this is well shown in the next slide **(No. 22),** which represents twinned copper. Just about the centre of the field there is a large dark crystal of copper, and in it you will notice three twins making roughly an equilateral triangle. Below one of the main bands there is a fine one running in the same direction. This means that movement in three different directions has taken place in the same crystal. Other systems of twinning are seen more faintly in some of the other crystals. If we carry the etching far enough we can show not only the twins but also the facets of the crystals themselves. These are clearly seen in the next slide **(No. 23),** which also represents the structure of twinned copper. We have a thin twin running right across one crystal, a thicker twin parallel to it running only about a third of the distance, and on the crystal itself a large number of minute squares which represent the etched facets of the main crystal.

Slip Bands and Twins.

We may get, during the straining process, both slipping and twinning taking place at the same time, and in this case very complicated patterns are liable to be produced. The next slide **(No. 24)** shows the structure of a brass which has been strained until it has produced both slip bands and twins. You will notice how involved and composite the structure is. The next **(No. 25)** shows, at a rather higher magnification, a system of slip lines crossing a twin. It is clear that they are displaced through a definite angle. The lines remain parallel after displacement and then, when a piece of untwinned metal is reached, they revert to their original orientation.

The beautiful patterns thus produced by straining metals and alloys are further evidence of their crystalline character, and show that, in spite of the regularity of structure which most metals possess, there are certain directions in which the crystals move more easily than others.

The Crystallisation of Alloys.

Let us consider next the types of structure we may get when two metals crystallise simultaneously together. We get these examples in cases of the following kind. Suppose we have a metal A which crystallises at a certain temperature. If we add to this a metal B, this will lower the freezing point of A to a certain extent. If we add more to it, the melting point will be lowered still further, and by adding a sufficient amount we can lower the melting point to a particular extent. If we now start with metal B, which has of course its own characteristic melting point, and add metal A to it, we shall find that the freezing point B is lowered. If we continue adding A we shall lower the freezing point more and more. Ultimately we shall reach a point when we have lowered the freezing point so much, that we have reached the same figure as we did when we lowered the freezing point of A by adding B. When we have prepared an alloy in these particular proportions we have the alloy of minimum freezing point in the series. This is known as the eutectic alloy derived from two Greek words meaning " easily melting " At this composition and temperature, the two metals freeze simultaneously, and we may get a great variety of patterns according to the properties of the metals concerned. Two of these properties are chiefly instrumental in determining the types of structure obtained. The one is what is called the " Vectorial force of crystallisation," as a result of which long crystals are produced, which have sharp angles and corners. The other is a property that I have already mentioned, viz., surface tension, which tends, owing to the energy in the surface, to make the crystals round, and thus destroy the evidence of their crystal form. Eutectic structures are mainly the resultant of these two forces which act in an opposed manner to one another. Looking at the matter in this way we can classify (but remember it is only a method of classification for convenience sake,) eutectic structures into four sub-sections.

1st Sub-Section. Structure: Spheroidal and Not Apparently Crystalline.

In these cases, which are chiefly confined to high melting metals, the crystals are completely rounded, and indeed do not appear like crystals at all. The next slide **(No. 26)** shows an example of this type, in which, as you will see, we have a large number of dark dots occurring in a white matrix. The dark dots represent one metal and the white matrix the other. The structure looks very like that of two liquids, but remember these are true crystals in the sense that the atoms composing them are oriented in a crystalline manner in the little spheres. The next slide **(No. 27)** shows an example of a similar kind, in which you will notice how extremely minute the crystals are. Both of these alloys possess exactly the eutectic structure owing to the composition being correct. But if the alloy varies a little from this composition, then one of the metals crystallises in excess, and this example is shown in the next slide **(No. 28),** in which the eutectic is composed of extremely minute particles of a light and dark constituent which are rounded, while the constituent in excess is represented by the large particles, one of which is obviously a dendrite. These crystals also, as you will notice, are rounded, but you will see that the dendrite is oriented in a particular manner, having crystallised along particular axes. A somewhat similar example is shown in the next slide **(No. 29),** though here, as you will notice, the rounding of the particles is not complete, and they are beginning to take on a lamellar form.

2nd Sub-Section. Structure: Oriented but Not Apparently Crystalline.

Examples of this type are seen in the next slide **(No. 30),** in which, although the crystals are still somewhat rounded, they are also to some extent elongated. The structure is in fact columnar. This example is furnished by the eutectic of the cadmium-tin system. Another example is furnished by the eutectic of the well known lead-tin system, in which the structure is noticeably lamellar. The crystals attain a considerable length and are not straight but curved. The eutectic here consists accordingly of a series of curved alternating plates of the two metals, which in the section appear as lines. Another example of a similar kind is furnished in the zinc-aluminium system shown in the next slide **(No. 31).**

3rd Sub-Section. Structure: Angular.

In the third sub-section which I have characterised as angular, one of the metals crystallises in elongated crystals which are not rounded at all and have in fact sharp extremities. An example of this kind is furnished by the eutectic of antimony and lead. In this slide **(No. 32)** the antimony crystals are shown light, while the lead crystals act as the filling-in material. Here we have two metals in which the two operative forces are shown very clearly. In antimony the vectorial force of crystallisation is predominant, while in lead the surface tension is the more powerful of the two. A somewhat similar example is shown in the next slide **(No. 33),** which contains a large hexagonal dendrite of a light metal, the interstices of which are filled in with a second dark metal.

4th Sub-Section. Structure: Crystalline.

In this case the eutectic manifestly consists of a mixture of two types of crystals. The slide shown **(No. 34)** gives us the structure of the eutectic of antimony and copper. The crystals of antimony are seen in the white, sharply-angled areas, while the copper, which is in the form of a compound of copper and antimony, is represented by the dark crystals.

You will see, therefore, that eutectics can furnish very differing types of what may be called mixed crystallisation. Some of the patterns which result are really beautiful.

The Crystallisation of Compounds.

Certain of the metals form what are called intermetallic compounds, i.e., they combine with one another. The compounds produced are not to be regarded as similar to those produced by the well known combinations of metal and non-metal, and indeed they differ from them in several respects; but they are nevertheless chemical compounds of a particular type. It so happens that certain of these produce crystals which are similar to those of salts and minerals, i.e., they possess plane faces. We can study crystals of this type best, not at the actual composition of the compound itself, but where it occurs in a eutectic. The compound is the first to separate from the liquid on freezing, and the crystals have time to grow to a considerable size in the liquid before the latter freezes. A striking example is shown in the next slide **(No. 35)** of the crystallisation of the compound of tin and antimony, Sn Sb, in a matrix of the eutectic. You are looking, of course, at sections of the crystals. You will notice that all of them possess plane faces. The reason why the shapes differ is that, in the section examined, the crystals have been cut through at different inclinations. An example of the dendritic structure of the compound of aluminium and zinc is shown in the next slide **(No. 36).** We have, near the centre, what we call a hexagonal dendrite, i.e., the crystal has grown along the hexagonal axis, but the filling-in process, which sets in at the solid angles thus produced, has not kept pace with it.

The Crystal Structures of Iron and Steel.

Let us now consider the crystal structures of iron and steel, or rather of a number of typical steels, for there are too many of them for us to be able to consider more than a selection. We will begin with pure iron, the structure of which is shown in the next slide **(No. 37).** It is very similar to that of the specimen of iron which I showed earlier in this address. The main difference is that the crystals are, on the whole, rather smaller. We are looking at a lightly etched specimen which shows the crystal boundaries dark and the crystals themselves light. You will notice the crystal size varies a good deal. Now let us add a little carbon to the iron, and make what is called a very soft steel, the kind of steel, for instance, that is used in making what are called tin plates, i.e., steel sheets which are to be surfaced with tin. You will notice that there is a complete change of structure. In place of the clear crystal boundaries of the iron which do not come up with light etching, we have a tolerably large number of small dark specks of irregular shape. These are little bits of steel which are distributed through the iron. You will see therefore, that when we add carbon to pure iron and make a steel of this kind, we do not get a homogeneous material but a composite one. The mass consists of crystals of iron with small crystals of steel distributed through them. If we now add a little more carbon, we get the effect shown in the next slide **(No. 38)**. There are rather more of the dark particles, and some of them are a little larger. With still more carbon we get the effect shown in the next slide **(No. 39)**, where the steel contains 0.17 per cent. of carbon. This has been etched sufficiently deeply to show the boundaries of the crystals as well as the little particles of steel. I want you to notice that in this slide there is one crystal of steel which shows a composite structure. We shall see this more closely in later slides, and we also see it in the next slide **(No. 40)**, which is one of the same steel, but at a higher magnification. Certain of the areas of steel appear dark, but in two or three of them a composite structure is evident. The next slide **(No. 41)** shows a steel containing 0.3 per cent. of carbon, and you will notice that the number of steel particles has increased. With 0.5 per cent. of carbon which is shown in the next slide **(No. 42)** they now occupy nearly half the field, i.e., the material consists of about equal parts of iron and steel crystals. In this slide we see, for the first time at this magnification, that the particles of steel are composite. Some of them have obviously a banded structure, and this is shown more clearly in the next slide **(No. 43)**, where you will see that the steel consists of alternating light and dark curved plates. These plates consist of iron and, not carbon, but a carbide of iron which is extremely hard, and the hardness of steel is due, not merely to the presence of this, but to its occurrence in the form of these thin plates.

Continuing the addition of carbon up to 0.7 per cent., we have the structure contained in the next slide **(No. 44)**, and here you will notice that the steel areas occupy by far the greater part of the field. The light areas represent the particles of iron. When we add 0.9 per cent. of carbon, the separate iron crystals disappear and the whole of the material consists of steel. This is shown in the next slide **(No. 45)**. So remember that pure steel consists of iron containing 0.9 per cent. of carbon in the form of carbide of iron. Any alloy containing less carbon than this consists of a mixture of iron and steel. The less the carbon the more the iron. The structure of this pure steel shown at a higher magnification is particularly well seen in the next slide **(No. 46)**, where you will notice the alternating plates of iron and carbide of iron. It is a structure resembling a lamellar eutectic, and indeed it is known as an eutectoid. The alternating plates of iron and iron carbide are not present in equal parts by volume. Actually there is about four-and-a-half times as much iron by volume as there is of iron carbide. These plates are so thin that in a linear inch of steel we may have 80,000 of them consisting of 40,000 of iron and 40,000 of iron carbide. It is this particular crystallisation of iron and iron carbide which constitutes the wonderful material we know as steel.

Continuing the addition of carbon to 1.1 per cent., which is the composition of an average turning tool, we see the structure shown in the next slide **(No. 47).** The greater part of the material still consists of steel, but the crystals are surrounded by a white constituent, which in this case is the carbide of iron. This, being a hard material, confers an added hardness to the steel, but in this form the steel is not at its hardest. To attain this, it needs to be quenched from a red heat in water. This, of course, is the well-known process of hardening steel by quenching, which was discovered certainly more than 2,000 years ago. The structure of the quenched steel is seen in the next slide **(No. 48),** and you will see that it is quite different from that of the unquenched material. The dark steel areas surrounded by light areas of carbide have vanished, and the whole has been replaced by what is clearly a laminated structure. This is the characteristic structure of a hardened steel. The size of the crystals varies according to the temperature at which quenching is carried out. The higher the temperature the larger the crystals. Remember that there is no hardening of the steel unless a certain minimum temperature in quenching is reached.

Damascene Steel.

One of the most famous of all steels is Damascene Steel. This originated in India and received the name Damascene largely because it was marketed in Damascus, one of the great trading centres in early days, and the Indian smiths sent their famous steels there. This is one of the most remarkable steels ever made, because of its hardness and durability. The structure of the steel as cast is shown in the next slide **(No. 49)** at a high magnification. It consists for the most part of steel together with several plates of iron carbide. In this form it is much too brittle to forge. The interest to us of this particular kind of steel is that the Eastern smiths found a way of forging it which was not known to the Western smiths. The method consists in heating it carefully to a particular temperature, forging it very slowly and carefully, and then cooling, then reheating and forging again, and continuing this with the utmost exactitude a great many times. One of the characteristics of the Damascene sword is the so-called watering on the surface of the blade. This is a pattern produced by the etching of the hardened sword. When this is examined under the microscope it is found that the large plates of iron carbide which make the original steel brittle have disappeared, and have been replaced by a large number of little spheroids of the same material. The Eastern smiths found that, by careful heating and very gentle forging, they could break up the plates without cracking the steel, and, by utilising the surface tension of the material, they were able to convert the angular hard carbide into the rounded form, which is tough, and which, when once produced, enables the steel to be forged and hardened without cracking. This is a most useful discovery, made empirically, which has since found many applications in industry.

Meteoric Iron.

Let me in conclusion show you the structure of a piece of meteoric iron. The evidence that is available points strongly to the fact that the central core of the earth consists of an alloy of iron and nickel. The special interest attached to the examination of meteoric iron is, that this, being the broken up material of some other planet which has been deposited here, shows us what the structure of such a material is. It is seen in the next slide **(No. 50)**, and is quite unlike any structure I have yet shown you. The magnification is quite low, only about 4 diameters. The structure is seen to consist of a number of coarse plates arranged in a rectanglar pattern. Two constituents are present, each of which is composed of an alloy of iron and nickel, but the compositions of the two are different. It is generally considered that this type of structure is the result of cooling under the conditions to which the meteorite has been exposed. One thing, at any rate, is clear, that the material from which it has resulted must have consisted of very large crystals.

Conclusion.

We have examined during this address a number of typical structures of metals and alloys. All of them consist of crystals. These are of a special type and possess characteristic properties. The size and shape of the crystals will vary with the method of casting and forging utilised in their preparation. Many of the crystals are plastic, and that is why metals and alloys can be forged. But however they are treated, whether in manufacture or use, they never cease to be crystals. That is one of the most important things that modern science has told us about them.

LIST OF SLIDES.

Surface Structures.

1. Star antimony.
2. Tellurium.
3. Tin.
4. Admiralty bronze.

Dendritic Structures.

5. Dendritic bismuth.
6. Dendritic iron.

Preparation of Specimens for Microscopic Examination.

7. Method of grinding.
8. Mounting device.
9. Method of illumination.

Interior Structures.

10. Polyhedra.
11. Microstructure of iron.
12. Dendritic growth leading to polyhedra.
13. Dendrites in brass.
14. Microstructure of aluminium bronze.

Deeper Etching.

15. Etched facets in silico-ferrite.
16. Etched facets in pure iron.
17. Etched facets in pure silver.

Methods of Straining Showing Crystal Structure.

Slip Bands.

18. Cast Alpha brass strained.
19. Slip bands in alpha brass.
20. Slip bands at 45° in manganese steel.

Twinning.

21. Twinning in tin.
22. Twinning in zinc.
23. Twinning in copper.
24. Ditto.

Combination of Slip Bands and Twins.

25. Slip bands and twins in alpha brass.

Crystallisation of Alloys. Eutectics.

Spheroidal.

26. Austenite-cementite.
27. Copper-copper oxide.
28. Copper-copper phosphide.
29. Ditto.

Oriented.

30. Cadmium-tin.
31. Lead-tin.
32. Zinc-aluminium.

Angular.

33. Lead-antimony.
34. Cadmium-bismuth.

Crystalline.

35. Copper-antimony.

Crystallisation of Compounds.

Idiomorphic.

36. Tin antimony.

Dendritic.

37. Aluminium-zinc.

Structures of Iron and Steel.

38. Pure iron.
39. Very soft steel.
40. Ditto.
41. Steel—0.17% Carbon, X 150.
42. ,, ,, ,, X 500.
43. ,, 0.29% carbon
44. ,, 0.49% carbon, X 150.
45. ,, ,, ,, X 500.
46. ,, 0.55% carbon.
47. ,, 0.9% ,, X 150.
48. ,, ,, ,, X 500.
49. ,, 1.1% carbon, annealed, X 150.
50. ,, ,, ,, , quenched.

Damascene Steel.

51. Steel—1.5% carbon, cast.
52. ,, ,, ,, , forged and heated.

53. **Meteoric iron.**

Presidential Address, 1937.

An Archæological Visit to Jerusalem and Bethlehem

By Professor John Cameron, M.D., D.Sc., F.R.S.E.

ABSTRACT.

The first impression of modern Jerusalem is one of peculiar disillusionment. During Sunday School days one's youthful fancy visualised a city surrounded by a high wall—protecting something precious, something sacred. What one sees on emerging from the railway station is a large modern city sprawling indiscriminately over the surrounding countryside. One has therefore literally to search for the walled city of biblical history After discovering this, a second shock is experienced on being informed that the present wall was built by Suleiman the Magnificent, a follower of Islam, in the middle of the sixteenth century. This served to remind one of the fact that the ancient walls were levelled to the ground after the historic siege by Titus in A.D. 70.

The Jaffa Gate is a convenient point from which to commence the exploration of the ancient city. To one side of this is seen the site of the breach made in the wall to allow the ex-Kaiser to effect his state entry into the city. In contrast to this display of egoism, one should remember the dignity and humility of General Allenby in making his official entry into the city on foot as a pilgrim rather than a conqueror. David Street is the main artery leading into the city from this gate. Very soon the so-called Tower of David is seen on the right. This had nothing whatever to do with King David. It represents the remains of the palace of Herod. Only the lower megalithic courses of masonry, however, belong to that period. Proceeding towards the Zion Gate, one passes the Monastery and Church of St. James, which is under the control of the Armenian Church. After his martyrdom by decapitation, a few followers obtained possession of his head, and buried it in a special shrine in this church.

We soon reached the Zion Gate and found directly in front of us the House of Caiaphas, the High Priest before whom Christ was brought after His arrest. We were shown the spot where Peter denied his Master thrice. This episode is commemorated on a neighbouring spire, the weather vane of which is a cock in the act of crowing. We visited in this vicinity the Upper Chamber, the scene of the Last Supper, and were amazed to find that it was now part of a Moslem mosque. The reputed tomb of David is underneath this building. The way in which

Mohammedans have annexed some of the sites famous in biblical history, and preserved them still as places of great sanctity, was one of the most remarkable facts elicited during this archaeological visit.

We visited the Wailing Wall on a Saturday forenoon, and thus found the Jewish services in full swing. We were informed that the mournful chanting was from the Lamentations of Jeremiah. This massive wall with its Cyclopean masonry evidently represents part of the retaining wall of the platform on which Solomon's temple was erected. This temple area is now occupied by a group of Mohammedan buildings, the most famous of which is the Dome of the Rock. This mosque with its walls of coloured marble and glazed tiles, surmounted by its graceful dome, is an inspiring sight. The rock which it covers is the reputed site where Abraham offered to sacrifice his son Isaac. The Moslems have utilised it as the spot from which Mohammed ascended to heaven on his phantom horse El Borak.

We explored the eastern wall of the city, and examined the famous Golden Gate and the Gate of St. Stephen. In this vicinity we were shown the church of St. Anne, the rock-hewn crypt of which is declared to have been the home of St. Anne and her husband Joachim, the parents of the Virgin Mary. Beside this is the Pool of Bethesda, the healing waters of which form the theme of the well known episode recorded in the fifth chapter of St. John's Gospel.

The Palace of Pontius Pilate is now occupied by the nunnery of the Sisters of Zion. From this point the Via Dolorosa leads towards Calvary, and we were shown the various Stations of the Cross on the way. It is important to recollect that the ancient street level is probably several feet below the present road surface, following the destruction of the city by Titus in A.D. 70. The reputed site of Calvary is now enclosed within the group of buildings known as the Church of the Holy Sepulchre. This consists of two very essential components, namely that which covers the site of the crucifixion, and that enclosing the Holy Sepulchre. It was deplorable to note the sad state of disrepair of this holy building. The facade has had to be shored up by a complex mass of girders at the expense of the government, while the main dome has also required steel reinforcing. This regrettable state of affairs is due to the clash of denominations and creeds in control of the building. These seem to be unable to agree on collective responsibility for its adequate preservation.

There has been much controversy regarding the actual site of Calvary. General Gordon, of Khartoum fame, took a special interest in this matter. After much careful investigation, he located it on what is now known as Gordon's Calvary, which is north of the Damascus Gate, and therefore outside the city wall. He questioned the site of the Church of the Holy Sepulchre, as it is inside the *present* city wall. In this relationship it is important to record the fact that two rock-hewn tombs, believed to be those of Joseph of Arimathea and Nicodemus, have been discovered in the Syrian Chapel, which is part of the Church of the Holy Sepulchre. It is definitely known that no tombs were allowed to be built within the city, which means that the site of the Church of the Holy Sepulchre must have been at one time outside the *ancient* city wall.

The visit to the Mount of Olives was a never to be forgotten experience, for it yielded a wonderful view of Jerusalem, while on gazing eastwards one could detect a distant bluish streak representing the Dead Sea. The Church of the Ascension provided another surprise, for we found it to be a Mohammedan mosque. In the centre of the floor is a piece of stone showing the imprint of a human foot. This represents the site of the Ascension Christians are permitted to hold service here on Ascension Day.

There is very little left of the Garden of Gethsemane, for it is mainly occupied by the huge new Franciscan basilica and monastery. The ancient olive tree, known as the Agony Tree, is believed to be a descendant of that under which Christ sat.

One day we visited Bethlehem, passing Rachel's tomb on the way. We were shown the field to the east of the town, where "shepherds watched their flocks by night" and saw the Star appear over Bethlethem. We were conducted to the Church of the Nativity, and were soon confronted by a high wall of massive masonry, reinforced by two huge buttresses, and possessing a tiny entrance four feet in height. We were incredulous at first when informed that this was the entrance to the church, but the guide's explanation was interesting, for he told us that the diminutive size of the opening was to prevent the infidel from desecrating the building by driving his cattle and other domestic animals into it. A second reason came into our minds as we entered, for it compelled us to bow our heads in reverence. The interior looked very tawdry and neglected, instancing once more a lack of interdenominational responsibility for the care of the sacred building. We were led down steps into the Grotto of the Nativity, which is underneath the east end of the church. The birthplace of Christ is indicated by a silver star on the floor of a small apse. It has fifteen lamps perpetually burning over it. A little to one side is the Chapel of the Manger. Another sacred spot is the Milk Grotto in which the Virgin and Child were hid prior to the flight into Egypt.

One came away from the Holy Land with the impression that, on the whole, the various holy places were reverenced and fairly well cared for both by Christians and Moslems. Various modern writers have expressed dubiety regarding the authenticity of many of these holy sites. This does not matter much. What really matters is the fact that this ancient city of Jerusalem was hallowed by the Presence of the Master.

Historical Lists of Officers of the Society.

Compiled by the late Mr. R. A. de Paiva.

Presidents

1903-4	J. E. Beale (Mayor of Bournemouth).
1904-5—1905-6	G. E. J. Crallan, M.A., M.B., M.R.C.S.
1906-7	H. J. Waddington, F.L.S.
1907-8—1908-9	A. Ransome, M.A., M.D., F.R.C.P., F.R.S.
1909-10	Dr. A. Smith Woodward, F.R.S., F.L.S., F.G.S.
1910-11	Dr. Dukinfield H. Scott, M.A., LL.D., F.R.S., F.L.S., F.G.S.
1911-12 — 1912-13	Sir E. Ray Lankester, K.C.B., M.A., LL.D., F.R.S., F.L.S.
1913-14 — 1914-15 —1915-16	Sir Daniel Morris, K.C.M.G., J.P., M.A., D.SC., D.C.L., F.L.S.
1916-17	The Rt. Hon. the Earl of Malmesbury, D.L., J.P.
1917-18	Sir Jethro J. H. Teall, M.A., D.SC., LL.D., F.R.S.
1918-19 — 1919-20	Field Marshal Lord Grenfell of Kilvey, G.C.B., G.C.M.G., LL.D., F.S.A.
1920-21	Lt.-Col. Sir David Prain, C.M.G., C.I.E., F.R.S.
1921-22 — 1922-23	F. G. Penrose, M.D., F.R.C.P., F.Z.S., M.B.O.U.
1923-24	Sir F. W. Keeble, K.B.E., D.SC., F.R.S.
1924-25 — 1925-26	Hubert Painter, B.SC., F.C.S.
1926-27 — 1927-28	Heywood Sumner, F.S.A.
1928-29	Claude Lyon.
1929-30	Professor F. O. Bower, D.SC., F.R.S.
1930-31	Henry Bury, M.A., F.L.S., F.G.S.
1931-32	Dr. Dukinfield Scott, M.A., LL.D., F.R.S., F.L.S., F.G.S.
1932-33	J. P. Williams-Freeman, M.D.
1933-34	Rev. F. C. R. Jourdain, M.A., F.Z.S., M.B.O.U.
1934-35	Sir F. W. Dyson, K.B.E., M.A., D.SC., LL.D., F.R.S., F.R.A.S.
1935-36	Henry Bury, M.A., F.L.S., F.G.S.
1936-37	Sir Harold Carpenter, M.A., D.SC., F.R.S.
1937-38	Professor John Cameron, M.D., D.SC., F.R.S.E.

Vice-Presidents

1916-36	H. Backhouse, F.R.H.S.
1905-14	G. Brownen, F.C.S.
1906-	G. E. J. Crallan, M.A., M.B., M.R.C.S.
1921-25	Field Marshal Lord Grenfell of Kilvey, G.C.B., G.C.M.G., LL.D., F.S.A.
1904	E. Hyla Greves, M.D., M.R.C.P.
1914-16	G. G. Hamilton, F.R.C.S., F.R.H.S.
1910-12	C. J. Hankinson, J.P.
1914-23	S. McCalmont Hill, D.C.L.
1905-20	J. E. Liddiard, F.R.G.S.
1904-28	Rev. E. F. Linton, M.A., F.L.S.
1918-28—29-36	Claude Lyon
1916-33	Sir Daniel Morris, K.C.M.G., J.P., M.A., D.SC., D.C.L., F.L.S.
1912-22	W. T. Ord, F.G.S.
1916-24—1926	Hubert Painter, B.SC., F.C.S.
1916-21—1923-32	F. G. Penrose, M.A., M.D., F.R.C.P., F.Z.S., M.B.O.U.
1909-21	A. Ransome, M.A., M.D., F.R.C.P., F.R.S.
1907-18	Miss C. Agnes Rooper
1904-8	W. Saville-Kent, F.L.S., F.Z.S., F.R.M.S.
1916-31	R. Vowell Sherring, F.L.S.
1918-25	Rev. H. Shaen Solly, M.A.
1905-11	A. W. Thomas, M.D.
1905-16	J. Roberts Thomson, M.D., F.R.C.P., J.P.
1905-6 — 1907-14	H. J. Waddington, F.L.S.
1928-32	Rev. C. O. S. Hatton, B.A., F.L.S.
1928-	Heywood Sumner, F.S.A.
1928-30—31-35—36-	Henry Bury, M.A., F.L.S., F.G.S.
1929	J. H. Ralph Smythe, J.P.
1931-32	Rev. A. G. Yates, M.A.
1932-34	Dukinfeld H. Scott, M.A., LL.D., F.R.S., F.G.S., F.L.S.
1932-	Miss Marcia Penrose, B.SC.

Vice-Presidents—*continued*

1932-33—34-	Rev. F. C. R. Jourdain, M.A., F.Z.S., M.B.O.U.
1932-	George Brumell, A.R.I.B.A. (Retd.)
1937-	L. Bleching Hall, F.L.S.
1937-	W. G. A. Robertson, M.D., D.SC
1937-	J. R. White, M.A.

Chairmen of Committee

1904-5	J. Roberts Thomson, M.D., F.R.C.P., J.P.
1905-6	J. E. Liddiard, F.R.G.S.
1906-7	H. J. Waddington, F.L.S.
1907-10	W. T. Ord, F.G.S.

Chairmen of Council

1910-11	W T. Ord, F.G.S.
1911-14	Sir Daniel Morris, K.C.M.G., J.P., M.A., D.SC., D.C.L., F.L.S.
1914-Dec. 15	G. G. Hamilton, M.A., F.R.C.S.
1916-17	Sir Daniel Morris, K.C.M.G., J.P., M.A., D.SC., D.C.L., F.L.S.
1917-Feb. 19	W. Munn Rankin, M.SC., B.SC.
1919-Mar. 20	Sir Daniel Morris, K.C.M.G., J.P., M.A., D.SC., D.C.L., F.L.S.
1920-22	Hubert Painter, B.SC, F.C.S.
1922-27	J. H. Ralph Smythe, J.P.
1927-32	Rev. C. O. S. Hatton, B.A., F.L.S.
1932-	Henry Bury, M.A., F.L.S., F.G.S.

Deputy Chairmen of Council

1911-14	G. G. Hamilton, M.A., F.R.C.S.
1914-Feb. 16	Henry Backhouse, F.R.H.S.
1916 Mar.-Nov. 16	R. O'B. Furlong, C.B., J.P., M.A.
1916 Dec.-17	W. Munn Rankin, M.SC., B.SC.
1917-19	F. G. Penrose, M.D,, F.R.C.P., F.Z.S., M.B.O.U.
1919-20	Hubert Painter, B.SC., F.C.S.
1920-22	J. H. Ralph Smythe, J.P.
1922-27	Rev. C. O. S. Hatton, B.A., F.L.S.
1927-28	J. H. Ralph Smythe, J.P.
1928-29	Claude Lyon
1929-31	F. G. Penrose, M.D., F.R.C.P., F.Z.S., M.B.O.U.
1931-32	Henry Bury, M.A., F.L.S., F.G.S.
1932-	Rev. F. C. R. Jourdain, M.A., F.Z.S., M.B.O.U.

Hon. Treasurers

1904-8	A. D. George.
1908-	G. Brumell, A.R.I.B.A.

Hon. Secretaries

1904-7	Miss C. Agnes Rooper and J. R. L. Dixon, M.R.C.S., L.R.C.P.
1907-8	J. R. L. Dixon, M.R.C.S., L.R.C.P., and H. Backhouse, F.R.H.S.
1908-10	J. R. L. Dixon, M.R.C.S., L.R.C.P., and Col. E. E. Markwick, C.B., C.B.E., F.R.A.S.
1910 Sept.-Oct.	J. Donkin, F.R.I.B.A.
1910-11	H. Le Jeune.
1911 Nov.-Feb. 1912	Sir A. Brooke Pechell, Bart., M.B.
1912 Apr.-Mar. 1914	T. Michell, M.I.C.E.
1914 Apr.-Oct.	R. A. de Paiva.
1914 Oct.-July 1917	R. A. de Paiva and T. Capper, M.A., B.SC.,
1917 July-25	R. A. de Paiva.
1925-26	R. A. de Paiva and Rev. A. G. Yates, M.A., R.N.,
1926-31	Rev. A. G. Yates, M.A., R.N.
1931-32	M. Hellier, O.B.E.
1932-36	R. Quick, F.S.A. (Scot.)
1936-	W. J. Woodhouse, A.C.P.

Hon. Assistant Secretaries

Apr. 1911-1912	T. Michell, M.I.C.E.
May Mar. 1912-1914	R. A. de Paiva.
1917-1918	G. G. Grace, B.Sc., A.R.C.Sc., F.E.S
1919-1920	W. G. Boul, M.A., LL.D., D.C.L.
1920-1936	W. J. Woodhouse, A.C.P., M.I.H.
1931	M. Hellier, O.B.E.

Hon. Financial Secretary

1905-8	J. H. Scott, M.E., M.I.M.C.E.

Assistant Secretary

1909-36	J. F. Spencer.
1936-	Miss K. A. Hunkin, B.A.

Hon. Librarians

1908-1909	A. Scott, B.A.
1909-1911	F. I. Cooke.
1911-1912	W. Munn Rankin, M.Sc., B.Sc.
1913-1919	H. J. Ellis.
1919 Oct.- Mar. 1926	J. Omer Cooper, F.E.S.
1920 Mar.- Jan. 1921	Rev. C. O. S. Hatton, B.A., F.L.S.
1921 Jan.-1936	Claude Lyon.
1923-1929	Miss A. G. Veale, Hon. Assistant Librarian.
1929-1936	S. Whitaker, Hon. Assistant Librarian.
1936-	S. Whitaker.

Hon. Editors

1911-12	G. E. J. Crallan, M.A., M.B., M.R.C.S.
1912-20	Hubert Painter, B.Sc., F.C.S.
1920-25	F. B. Taylor, B.A.
1925-	J. R. White, M.A.

Hon. Curators

1917 Jan.- July 1921	W. G. Wallace.
1921-Dec. 1922	No Curator.
1923 Jan.-Nov.	Rev. C. O. S. Hatton, B.A., F.L.S., and Howard Lacey, B.A.
1923 Dec.-32	Rev. C. O. S. Hatton, B.A., F.L.S.
1932-37	Bernard Gorton, M.R.C.V.S., M.P.S.
1937-	W. C. Simmons, B.Sc., A.R.C.S., F.G.S.

Chairmen of Sections

Antiquarian

1904-7	A. W. Thomas, M.D., M.R.C.S.

Archæological and Historical

1907-8	A. W. Thomas, M.D., M.R.C.S.
1908-Feb. 14	G. Brownen, F.C.S.
1914 May-Nov.	Rev. Canon T. E. Usherwood, M.A.
1914 Dec.-24	Rev. H. Shaen Solly, M.A.
1924-26	Col. J. R. Dodd, M.D., F.R.C.S.
1926-33	R. K. Cardew, B.A.
1933-34	A. S. Hemmy, M.Sc.
1934-	J. Cameron, M.D., D.Sc.

Deputy Chairmen

1922-24	Col. J. R. Dodd, M.D., F.R.C.S.
1925-26	R. K. Cardew, B.A.

Astronomical

1920-24	Col. E. E. Markwick, C.B., C.B.E., F.R.A.S
1925-26	G. E. J. Crallan, M.A., M.B., M.R.C.S
1928-29	L. B. Benny, M.A., B.SC., F.R.A.S.
1929-31	J. A. Formoy, F.R.A.S.
1931-	W. Goodacre, F.R.A.S.

Deputy-Chairmen

1927-28	L. B. Benny, M.A., B.SC., F.R.A.S.
1931	W. Goodacre, F.R.A.S.

Mathematical

1921-22	W. H. Scott, M.A
1922-24	B. M. Peek, M.A., F.R.A.S.

Astronomical and Mathematical

1924-25	B. M. Peek, M.A., F.R.A.S.

Botanical

1904-5	Rev. E. F. Linton, M.A., F.L.S.
1905-7	J. F. Rayner, F.R.H.S.
1907-May 18	Miss C. Agnes Rooper.
1918-22	Rev. C. O. S. Hatton, B.A., F.L.S.
1922-26	Howard Lacey, B.A.
1926-27	Rev. C. O. S. Hatton, B.A., F.L.S
1927-	L. Beeching Hall, F.L.S.

Entomological

1914-15	R. Beck, F.E.S.
1915-Dec. 19	F. G. Penrose, M.D., F.R.C.P., F.Z.S., M.B.O.U
1920-Jan. 26	J. Neale, B.A.
1926-29	Howard Lacey, B.A.
1929-33	Alan Druitt, F.E.S.
1933-34	P. M. Bright, J.P.
1934-35	T. E. Belcher.
1935-36	G. E. J. Crallan, M.A., M.B., M.R.C.S.
1937-	B. Gorton, M.R.C.V.S., M.P.S.

Geographical

1908-10	J. E. Liddiard, F.R.G.S.
1910-11	A. Scott, B.A
1911-16	G. de Castro, M.R.C.S.
1916-36	Claude Lyon.
1936-	W. J. Woodhouse, A.C.P.

Geological

1904-5	Rev. G. D. Shenton, B.A.
1905-6	The Marquis de Trevelec.
1906-14	W. T. Ord, F.G.S.
1914-17	W. Munn Rankin, M.SC., B.SC.
1917-18	H. Kidner, F.G.S.
1918-20	W. Munn Rankin, M.SC., B.SC.
1920-23	W. J. Woodhouse, A.C.P., M.I.H.
1923-	Henry Bury, M.A., F.L.S., F.G.S.

Photographic

1905-8	Councillor R. Y. Banks.
1908-10	C. J. Hankinson, J.P.
1910-12	E. W. Barlow, F.R.A.S.
1912-13	G. Brumell, A.R.I.B.A.
1913-14	No Chairman.
1914-16	R. Y. Banks.

Photographic and Record

1916-25 ...	... R. Y. Banks.
1925-30 ...	... W. Dieselhorst, A.M.I.C.E.
1930- ...	... S. Whitaker.

Physical

1904-26 ...	... Hubert Painter, B.SC., F.C.S.
1928-29 ...	... G. E. J. Crallan, M.A., M.B., M.R.C.S.
1929-33 ...	... Miss Marcia Penrose, B.SC.
1933- ...	... W. H. Marsh, B.SC.

Deputy Chairman

1926-28 ...	... G. E. J. Crallan, M.A., M.B., M.R.C.S.

Zoological

1904-8 ...	... G. E. J. Crallan, M.A., M.B., M.R.C.S.
1908-10 ...	... A. W. Thomas, M.D., M.R.C.S.
1913-14 ...	... W. Munn Rankin, M.SC., B.SC.
1922-31 ...	... F. G. Penrose, M.D., F.R.C.P., F.Z.S., M.B.O.U.
1931- ...	... Rev. F. C. R. Jourdain, M.A., F.Z.S., M.B.O.U.

Microscopical

1909 Mar.-10	... J. R. L. Dixon, M.R.C.S., L.R.C.P.
1913-14 ...	... H. B. Wells, F.R.M.S.
1922-30	... F. B. Taylor, B.A.
1930-31 ...	... F. W. Parrot.
1931-35 ...	... S. Whitaker.
1935- ...	... M. McDougall, M.B., B.S.

Zoological and Microscopical

1910-11 ...	... H. B. Wells, F.R.M.S. A. W. Thomas, M.D., M.R.C.S.
1911 Mar.-12	... G. E. J. Crallan, M.A., M.B., M.R.C.S.
1911-13 ...	... H. B. Wells, F.R.M.S.
1914-16 ...	... T. B. Goodall, F.R.C.V.S., F.L.S.
1916-22 ...	... F. G. Penrose, M.D., F.R.C.P., F.Z.S., M.B.O.U.

Elected and co-opted Members of Council.

Title changed from Committee in 1910.

Many of these also had seats on the Council ex-officio either before or after their election or co-option. Their names are marked*

1905-7	Atkins, Dr. F.
1906—1908-36 ...	*Backhouse, H., F.R.H.S.
1914-15	*Banks, R. Y.
1905-6	Bax, P. B. Ironside.
1904	Bond, Dr. Eleanor.
1932-33	Borrett, Surg.-Capt. G. G.
1919-20	Boul, Mrs.
1930-	Broad, F.
1904-8	*Brownen, G., F.C.S.
1906-8	*Brumell, G., A.R.I.B.A.
1906-8	Buckland, Dr. Frank.
1930-	Burton, E. St. John, F.L.S., F.G.S., F.Z.S.
1921-22—1933-34	*Cardew, R. K., B.A.
1909-11	Chandler, S. Whitty, B.A.
1905-6	Clements, Lt.-Col. W. G.
1904	Clift, Dr.
1921-28	Curme, Mrs.
1905-10	Curtis, W. Parkinson, F.E.S
1936-	De Castro, H.
1923-26—1927-30	*Dodd, Col. J. R., M.D., F.R.C.S.
1914-16	Druitt, J., J.P.
1916-17	Dyer, J. Herbert.
1919-25	*Ellis, H. J.
1910-30	French, J. M.
1929-	Fryer, Miss C. H.
1914-17	Furlong, R. O'B., C.B., M.A.
1919-Aug. 21 ...	*George, A. D.
1904	Giles, Dr.
1904-6	*Goodall, T. B., F.R.C.V.S., F.L.S.
1918-20	Gosse, W., M.D., D.P.H.
1921-23	Gray, Arthur.
1910-15	Hamilton, G. G., M.B., F.R.C.S.
1916-18 — 1922-23	*Hatton, Rev. C. O. S., B.A., F.L.S.
1911-16	Hill, S. McCalmont, D.C.L.
1937-	Hunkin, Miss K. A., B.A.
1926-30	Hurry, J. B., M.A., M.D.
1937-	James, Mrs.
1916-19	Jeffery, T. J. P.
1930-31	*Jourdain, Rev. F. C. R., M.A., M.B.O.U., F.Z.S.
1906-10 — 1911-18	*Le Jeune, H.
1926-33	Longbottom, F. W., F.R.A.S.
1933-	Lowther, F. L., B.A.
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1932-3	*Marsh, W. H., B.Sc.
1907-8	Maude, W. C., J.P.
1935-6	McDougall, M., M.B., B.S.
1931-35	Morrell, C. Conyers, M.D., F.R.A.S.
1910-16	*Morris, Sir Daniel, K.C.M.G., J.P., M.A., D.Sc., LL.D., F.L.S.
1910-11	*Michell, T., M.I.C.E.
1916-19	*Neale, Joseph, B.A.
1905-6	*Ord, W. T., F.G.S.
1904	Parish, Miss
1932-3	Pattinson, Dr. T. W.
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1933-	*Penrose, Miss M., B.Sc.
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1918-19	Rothwell, Mrs.
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1930-31	*Whitaker, S.
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